Nalla Narasimha Reddy Group of Institutions
NNRG
Integrated Campus

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

(UGC AUTONOMOUS INSTITUTION)

Chowdariguda (V), Korremula 'X' Road, Ghatkesar (M), Medchal - Malkajgiri (D), Hyderabad. – 500088, T.S

B.Tech. in CIVIL ENGINEERING

Course Structure & Syllabus (R21)

Applicable from 2021-22 Admitted Batch

I YEAR I SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	BSC	21MA101BS	Mathematics - I	3	1	0	4
2	BSC	21PH102BS	Engineering Physics	3	1	0	4
3	ESC	21CS103ES	Programming for Problem Solving	3	1	0	4
4	ESC	21ME104ES	Engineering Graphics	1	0	4	3
5	BSC	21PH105BS	Engineering Physics Lab	0	0	3	1.5
6	ESC	21CS106ES	Programming for Problem Solving Lab	0	0	3	1.5
7	ESC	*21MC109ES	Environmental Science	3	0	0	0
			Induction Programme				
			Total Credits	**13**	**3**	**10**	**18**

I YEAR II SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	BSC	21MA201BS	Mathematics - II	3	1	0	4
2	BSC	21CH202BS	Chemistry	3	1	0	4
3	ESC	21ME203ES	Engineering Mechanics	3	1	0	4
4	ESC	21ME205ES	Engineering Workshop	1	0	3	2.5
5	HSMC	21EN205HS	English	2	0	0	2
6	BSC	21CH206BS	Engineering Chemistry Lab	0	0	3	1.5
7	HSMC	21EN207HS	English Language and Communication SkillsLab	0	0	2	1
			Total Credits	**12**	**3**	**8**	**19.0**

II YEAR I SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	PCC	21CE301PC	Surveying and Geomatics	3	0	0	3
2	PCC	21CE302PC	Engineering Geology	2	0	0	2
3	PCC	21CE303PC	Strength of Materials - I	3	1	0	4
4	HSMC	21MA304BS	Probability and Statistics	3	1	0	4
5	PCC	21CE305PC	Fluid Mechanics	3	1	0	4
6	PCC	21CE306PC	Surveying Lab	0	0	3	1.5
7	PCC	21CE307PC	Strength of Materials Lab	0	0	3	1.5
8	PCC	21CE308PC	Engineering Geology Lab	0	0	2	1
9	HSMC	*21MC309	Constitution of India	3	0	0	0

			Total Credits	**17**	**3**	**8**	**21**

II YEAR II SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	ESC	21EE401ES	Basic Electrical and Electronics Engineering	3	0	0	3
2	PCC	21CE402ES	Basic Mechanical Engineering for Civil Engineers	2	0	0	2
3	PCC	21CE403PC	Building Materials, Construction and Planning	3	0	0	3
4	PCC	21CE404PC	Strength of Materials - II	3	0	0	3
5	PCC	21CE405PC	Hydraulics and Hydraulic Machinery	3	0	0	3
6	PCC	21CE406PC	Structural Analysis - I	3	0	0	3
7	PCC	21CE407PC	Computer aided Civil Engineering Drawing	0	0	3	1.5
8	PCC	21CE409PC	Hydraulics and Hydraulic Machinery Lab	0	0	3	1.5
9	ESC	21EE409ES	Basic Electrical and Electronics Engineering Lab	0	0	2	1
10	HSMC	*21MC409	Gender Sensitization Lab	0	0	2	0
			Total Credits	**17**	**0**	**10**	**21**

III YEAR I SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	PCC	21CE501PC	Structural Analysis-II	3	0	0	3
2	PCC	21CE502PC	Geotechnical Engineering	3	0	0	3
3	PCC	21CE503PC	Structural Engineering –I **(RCC)**	3	1	0	4
4	PCC	21CE504PC	Transportation Engineering	3	0	0	3
5	PCC		Professional Elective-I	3	0	0	3
6	HSMC	21SM505MS	Engineering Economics and Accountancy	2	0	0	2
7	PCC	21CE506PC	Highway Engineering and Concrete Technology Lab	0	0	3	1.5
8	PCC	21CE507PC	Geotechnical Engineering Lab	0	0	3	1.5
9	HSMC	21EN508HS	Advanced Communication Skills Lab	0	0	2	1
10	HSMC	*21MC509	Intellectual Property Rights	3	0	0	0
			Total Credits	**20**	**1**	**8**	**22**

III YEAR II SEMESTER

S. No	Course Type	Course Code	Course Title	L	T	P	Credits
1	PCC	21CE601PC	Hydrology & Water Resources	3	1	0	4

			Engineering				
2	PCC	21CE602PC	Environmental Engineering	3	0	0	3
3	PCC	21CE603PC	Foundation Engineering	3	0	0	3
4	PCC	21CE604PC	Structural Engineering –II **(Steel)**	3	1	0	4
5	PCC		Professional Elective –II	3	0	0	3
6	OEC		Open Elective –I	3	0	0	3
7	PCC	21CE605PC	Environmental Engineering Lab	0	0	2	1
8	PCC	21CE606PC	Computer Aided Design Lab	0	0	2	1
9		*21MC609	Environmental Science	3	0	0	0
			Total Credits	**21**	**2**	**4**	**22**

IV YEAR I SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	PCC	21CE701PC	Estimation, Costing and Project Management	3	1	0	4
2	PCC		Professional Elective –III	3	0	0	3
3	PCC		Professional Elective –IV	3	0	0	3
4	OEC		Open Elective –II	3	0	0	3
5	HSMC	21SM702MS	Professional Practice law & Ethics	2	0	0	2
6	PCC	21CE703PC	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2*
7	PCC	21CE704PC	Seminar	0	0	2	1
8	PCC	21CE705PC	Project Stage - I	0	0	6	3
			Total Credits	**14**	**1**	**12**	**21**

IV YEAR II SEMESTER

S. No.	Course Type	Course Code	Course Title	L	T	P	Credits
1	PCC		Professional Elective -V	3	0	0	3
2	PCC		Professional Elective –VI	3	0	0	3
3	OEC		Open Elective –III	3	0	0	3
4	PCC	21CE801PC	Project Stage-II	0	0	14	7
			Total Credits	**9**	**0**	**14**	**16**

HSMC: Humanities and Social Sciences including Management Course
BSE: Basic Science Course
ESC: Engineering Science Course
PCC: Professional Core Course
PEC: Professional Elective Course
OEC: Open Elective Course
MC: Mandatory Course

***MC - Environmental Science – Should be Registered by Lateral Entry Students Only.**
***MC – Satisfactory/Unsatisfactory**

Note: Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

Professional Elective – I

21CE511PE	Concrete Technology
21CE512PE	Theory of Elasticity
21CE513PE	Rock Mechanics

Professional Elective – II

21CE611PE	Prestressed Concrete
21CE612PE	Elements of Earth Quake Engineering
21CE613PE	Advanced Structural Analysis

Professional Elective-III

21CE711PE	Remote Sensing &GIS
21CE712PE	Ground Improvement Techniques
21CE713PE	Advanced Structural Design

Professional Elective -IV

21CE721PE	Irrigation and Hydraulic Structures
21CE722PE	Pipeline Engineering
21CE723PE	Ground Water Hydrology

Professional Elective –V

21CE811PE	Solid Waste Management
21CE812PE	Environmental Impact Assessment
21CE813PE	Air pollution

Professional Elective -VI

21CE821PE	Airports, Railways and Waterways
21CE822PE	Urban Transportation Planning
21CE823PE	Finite Element Methods for Civil Engineering

21MA101BS: MATHEMATICS - I

B.Tech. I Year I Sem.

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solvingthe system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematicalproblems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of thesystem of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison

test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

21PH102BS: ENGINEERING PHYSICS

B.Tech. I Year I Sem.

L	T	P	C
3	1	0	4

Course Objectives:

- The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- Students will be able to demonstrate competency and understanding of the concepts found in Mechanics, Harmonic Oscillations, Waves in one dimension, wave Optics, Lasers, Fiber Optics and a broad base of knowledge in physics.
- The main purpose of this course is to equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficially in their higher pursuits.
- Today the need is to stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphereof change he will encounter during his carrier.

Course outcomes: Upon graduation, the graduates will have:

- The knowledge of Physics relevant to engineering is critical for converting ideas intotechnology.
- An understanding of Physics also helps engineers understand the working and limitations ofexisting devices and techniques, which eventually leads to new innovations and improvements.
- In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics.
- Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.

UNIT-I: Introduction to Mechanics

Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Form invariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, Problems including constraints and friction, Extension to cylindrical and spherical coordinates.

UNIT-II: Harmonic Oscillations

Mechanical and electrical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion, Damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical and electrical oscillators, Mechanical and electrical impedance, Steady state motion of forced damped harmonic oscillator, Power observed by oscillator.

UNIT-III: Waves in one dimension

Transverse wave on a string, The wave equation on a string, Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching, Standing waves and their Eigen frequencies, Longitudinal waves and the wave equations for them, Acoustic waves and speed of sound,Standing sound waves.

UNIT-IV: Wave Optics

Huygen's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach- Zehnder interferometer, Fraunhofer diffraction from a single slit and circular aperture, Diffraction grating- resolving power.

UNIT-V: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO2) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

TEXT BOOKS:

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics', 3rd Edn, Cambridge University Press, 2018.
3. Ajoy Ghatak, "Optics", McGraw Hill Education, 2012

REFERENCE BOOKS:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
2. O. Svelto, "Principles of Lasers"
3. "Introduction to Mechanics", M.K.Verma, Universities Press

21CS103ES / 21CS203ES: PROGRAMMING FOR PROBLEM SOLVING

B.Tech. I Year I Sem.

L	T	P	C
3	1	0	4

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, processor,operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntaxand Logical Errors in compilation, object and executable code , Operators, expressions andprecedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,The main method and command line arguments
Bitwise operations: Bitwise AND, OR, XOR and NOT operators
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branchingwith if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops
I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions availablein C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures
Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data toexisting files, Writing and reading structures using binary files, Random access using fseek, ftell andrewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursivefunctions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of differentdata types

UNIT - V: Introduction to Algorithms:

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a givenset, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

21ME104ES / 21ME204ES: ENGINEERING GRAPHICS

B.Tech. I Year I Sem.

L	T	P	C
1	0	4	3

Pre-requisites: Nil

Course objectives:

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone,
Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Introduction to CAD: (For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2DSketches by CAD Package

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali / Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

21PH105BS: ENGINEERING PHYSICS LAB

B.Tech. I Year I Sem.

L	T	P	C
0	0	3	1.5

List of Experiments:

1. Melde's experiment:
   To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.
2. Torsional pendulum:
   To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings:
   To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating:
   To determine the number of lines per inch of the grating.
5. Dispersive power:
   To determine the dispersive power of prism by using spectrometer.
6. Coupled Oscillator:
   To determine the spring constant by single coupled oscillator.
7. LCR Circuit:
   To determine quality factor and resonant frequency of LCR circuit.
8. LASER:
   To study the characteristics of LASER sources.
9. Optical fibre:
   To determine the bending losses of Optical fibres.
10. Optical fibre:
    To determine the Numerical aperture of a given fibre.

Note: Any 8 experiments are to be performed

21CS106ES / 21CS206ES: PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. I Year I Sem.

L	T	P	C
0	0	3	1.5

[Note: The programs may be executed using any available Open Source/ Freely available IDE

Some of the Tools available are:

Code Lite: https://codelite.org/
Code::Blocks:
http://www.codeblocks.org/

Dev Cpp :
http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org

This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a. Write a program for fiend the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15
h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given numberis palindrome.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Writea C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value.i. 1-x/2 +x^2/4-x^3/6
i . Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements insingle dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. ii. Multiplication of Two Matrices

f. iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row andcolumn counts may not be same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. ii. To find the GCD (greatest common divisor) of two given integers.
j. iii. To find x^n
k. Write a program for reading elements using pointer into array and display the values usingarray.
l. Write a program for display values reverse order from array using pointer.
m. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with theiruppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file nameand the character are supplied as command line arguments.
d. Write a C program that does the following:
   It should first create a binary file and store 10 integers, where the file name and 10 values aregiven in the command line. (hint: convert the strings using atoi function)
   Now the program asks for an index and a value from the user and the value at that index shouldbe changed to the new value in the file. (hint: use fseek function)
   The program should then read all 10 values and print them back.
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followedby those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string in to a given main string from a given position.
e. ii. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in bothdirections with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘tcontain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.
b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * *
                                             *
                                4 4 4 4    * *
                                             *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)
iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
iv. Hall of India
v. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
vi. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vii. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

*21MC109ES: ENVIRONMENTAL SCIENCE

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversity Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHI Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

21MA201BS: MATHEMATICS - II

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real worldproblems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass andGravity for cubes, sphere and rectangular parallelopiped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax , cos ax, polynomials in x, $e^{ax}V(x)$ and $x\ V(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and theirapplications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.

REFERENCE BOOKS:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

21CH102BS / 21CH202BS: CHEMISTRY

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become aperfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makesthe student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essentialfor the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understandingreaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:

- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding theproblem of water and its treatments.
- The required skills to get clear concepts on basic spectroscopy and application to medical andother fields.
- The knowledge of configurational and conformational analysis of molecules and reactionmechanisms.

UNIT - I:

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and F2 molecules. π molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect ofdoping on conductance.

UNIT - II:

Water and its treatment: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT - III:

Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT - IV:

Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformational analysis of n- butane.

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4 andchromic acid.

Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT - V:

Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy. vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., NewDelhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

21ME203ES: ENGINEERING MECHANICS

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problemsusing equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass momentof inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motionand plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation andplane motion and the concept of vibrations

Course Outcomes: At the end of the course, students will be able to

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjectedto a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotator motion and rigid body motion.
- Solve problems using work energy equations for translation, fixed axis rotation and planemotion and solve problems of vibration.

UNIT-I:

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

UNIT-II:

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Centroid and Centre of Gravity - Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus

UNIT-III:

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; Product of Inertia,Parallel Axis Theorem, Perpendicular Axis Theorem

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of

Inertia
– Mass moment of inertia of composite bodies.

UNIT-IV:

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear,angular); Impact (Direct and oblique).

UNIT-V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics –Statics & Dynamics

REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition,1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.

21ME105ES / 21ME205ES: ENGINEERING WORKSHOP

B.Tech. I Year II Sem.

L	T	P	C
1	0	3	2.5

Pre-requisites: Practical skill

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineeringproducts.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipmentand machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work toprescribed tolerances.

Course Outcomes: At the end of the course, the student will be able to:

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting,carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes includingdrilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

21EN105HS / 21EN205HS: ENGLISH

B.Tech. I Year II Sem.

L	T	P	C
2	0	0	2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contextsand cultures.*

Learning Objectives: The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoreticaland practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writingand speaking skills.

UNIT –I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.**Reading:** Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' publishedby Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by CambridgeUniversity Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to formDerivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence

UNIT –IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published byCambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English forEngineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: **Technical Reports**- Introduction – Characteristics of a Report Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXT BOOK:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.

2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

21CH106BS / 21CH206BS: ENGINEERING CHEMISTRY LAB

B.Tech. I Year II Sem.

L	T	P	C
0	0	3	1.5

Course Objectives: The course consists of experiments related to the principles of chemistry requiredfor engineering student. The student will learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as an function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layerchromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of Rf values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5^{th} edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

21EN107HS / 21EN207HS: ENGLISH LANGUAGEAND COMMUNICATION SKILLS LAB

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Syllabus:

English Language and Communication Skills Lab (ELCS) shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

- To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right into nation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

- To involve students in speaking activities in various contexts
- To enable students express themselves fluently and appropriately in social and professional contexts
    - Oral practice Just A Minute (JAM)Sessions.
    - Describing objects/situations/people
    - Role play– Individual/Group activities

The following course content is prescribed for the **English Language Communication Skills Lab**.

EXERCISE –I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker.

Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language-Formal and Informal English.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing one self and Others.

EXERCISE–II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Sentence Stress–Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Sentence Stress–Intonation.

Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication. *Practice:* Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions-Telephone Etiquette.

EXERCISE – III

CALL Lab:

Understand: Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

Testing Exercises

ICS Lab:

Understand: Descriptions-Narrations-Giving Directions and Guidelines.

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions– Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

EXERCISE–IV

CALL Lab:

Understand: Listening for General Details. *Practice:* Listening Comprehension Tests. *Testing Exercises*

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech–Extempore- Making a Presentation.

EXERCISE–V

CALL Lab:

Understand: Listening for Specific Details. *Practice:* Listening Comprehension Tests.

Testing Exercises
ICS Lab:
Understand: Group Discussion- Interview Skills
Practice: Group Discussion- Mock Interviews

21CE301PC: SURVEYING AND GEOMATICS

B.Tech. II Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The object of the course student should have the capability to:

- Know the principle and methods of surveying.
- Measure horizontal and vertical- distances and angles
- Recording of observation accurately
- Perform calculations based on the observation
- Identification of source of errors and rectification methods
- Apply surveying principles to determine areas and volumes and setting out curves
- Use modern surveying equipment's for accurate results

Course Outcomes: Course will enable the student to:

- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and correctivemeasures
- Interpret survey data and compute areas and volumes, levels by different type of equipmentand relate the knowledge to the modern equipment and methodologies

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phasesof surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, bookingand Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes - Determination of volume of earth work in cutting and embankments for level section, volumeof borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of verticalAngle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

UNIT - IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves.

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, **Modern Surveying Methods:** Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and Applications.

UNIT - V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

TEXT BOOKS:

1. Chandra A M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd.,Publishers, New Delhi.
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
4. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - LaxmiPublications (P) ltd., New Delhi.

21CE302PC: ENGINEERING GEOLOGY

B.Tech. II Year I Sem.	L	T/P/D	C
	2	0/0/0	2

Course Objectives: The objective of this Course is

- To give the basics knowledge of Geology that is required for constructing various CivilEngineering Structures, basic Geology, Geological Hazardous and Environmental Geology
- To focus on the core activities of engineering geologists – site characterization and geologichazard identification and mitigation. Planning and construction of major Civil Engineering projects

Course Outcomes: At the end of the course, the student will be able to:

- Site characterization and how to collect, analyze, and report geologic data using standards inengineering practice
- The fundamentals of the engineering properties of Earth materials and fluids.
- Rock mass characterization and the mechanics of planar rock slides and topples

UNIT - I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physicalgeology, Petrology and Structural geology.

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite , Galena , Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss,Schist, Quartzite, Marble and Slate.

UNIT - III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults uncomfornities, and joints - their important types and case studies. Their importance Insitu and drift soils, common types of soils, their

origin and occurrence in India, Stabilisation of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT - IV

Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect;measures to be taken to prevent their occurrence.

Importance of Geophysical Studies: Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - V

Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

REFERENCE BOOKS:

1. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers &Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI

21CE303PC: STRENGTH OF MATERIALS – I

B.Tech. II Year I Sem.	L	T/P/D	C
	3	1/0/0	4

Pre-Requisites: Engineering Mechanics

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries such as bars, cantileversand beams for various types of simple loads
- To calculate the elastic deformation occurring in simple members for differenttypes of loading.
- To show the plane stress transformation with a particular coordinate system for differentorientation of the plane.
- To know different failure theories adopted in designing of structural members

Course Outcome: On completion of the course, the student will be able to:

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
- Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
- Analyze various situations involving structural members subjected to plane stresses byapplication of Mohr's circle of stress;
- Frame an idea to design a system, component, or process

UNIT – I
SIMPLE STRESSES AND STRAINS:

Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity– Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars ofvarying section – composite bars – Temperature stresses.

STRAIN ENERGY – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT – II
SHEAR FORCE AND BENDING MOMENT:

Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of

contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
FLEXURAL STRESSES:

Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES:

Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

UNIT – IV
DEFLECTION OF BEAMS:

Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple -Mohr's theorems – Moment area method – Application to simple cases.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.

UNIT – V
PRINCIPAL STRESSES:

Introduction – Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.

THEORIES OF FAILURE: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

TEXT BOOKS:

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press

REFERENCE BOOKS:

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Presss

21MA304BS: PROBABILITY AND STATISTICS

B.Tech. II Year I Sem.	L	T/P/D	C
	3	1/0/0	4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- The ideas of probability and random variables and various discrete and continuousprobability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.

Course outcomes: After learning the contents of this paper the student must be able to

- Formulate and solve problems involving random variables and apply statistical methods foranalysing experimental data.

UNIT - I: Basic Probability **8 L**

Probability spaces, conditional probability, independent events, and Bayes' theorem. Random variables: Discrete and continuous random variables, Expectation of Random Variables,Moments, Variance of random variables, Chebyshev's Inequality

UNIT - II: Discrete Probability distributions **10L**

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson approximationto the binomial distribution

UNIT - III: Continuous Random variable & Distributions **10L**

Continuous random variables and their properties, distribution functions and densities, Normal, exponential and gamma distributions, evaluation of statistical parameters for thesedistributions

UNIT - IV: Applied Statistics **10L**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas andmore general curves; Correlation and regression – Rank correlation.

UNIT - V: Testing of Hypothesis **10L**

Test of significance: Large sample test for single proportion, difference of proportions, single mean,difference of means; Test for single mean, difference of means for small samples, test for ratio of variances for small samples.

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statisticsfor engineers and scientists, 9th Edition, Pearson Publications.
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor.

REFERENCES:

1. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

21CE305PC: FLUID MECHANICS

B.Tech. II Year I Sem.	L	T/P/D	C
	3	1/0/0	4

Course Objectives: The objectives of the course are to

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- Learn about the application of mass, energy and momentum conservation laws for fluid flows
- Train and analyse engineering problems involving fluids with a mechanistic perspective isessential for the civil engineering students
- To obtain the velocity and pressure variations in various types of simple flows
- To prepare a student to build a good fundamental background useful in the application-intensivecourses covering hydraulics, hydraulic machinery and hydrology

Course Outcomes: Upon completion of this course, students should be able to:

- Understand the broad principles of fluid statics, kinematics and dynamics
- Understand definitions of the basic terms used in fluid mechanics and characteristics of fluidsand its flow
- Understand classifications of fluid flow
- Be able to apply the continuity, momentum and energy principles

UNIT – I

Properties of Fluid

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics

Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges. Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT - II

Fluid Kinematics

Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two- and three-dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two- and three-dimensional continuity equations in Cartesian coordinates.

Fluid Dynamics

Surface and Body forces -Euler's and Bernoulli's equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernolli's equation to real fluid flows.

UNIT - III

Flow Measurement in Pipes

Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

Flow Over Notches & Weirs

Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

UNIT – IV

Flow through Pipes

Reynolds experiment, Reynolds number**,** Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures.

UNIT - V

Laminar & Turbulent Flow

Laminar flow through: circular pipes, annulus and parallel plates.

Boundary Layer Concepts

Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Definition of Drag and Lift and types drag, magnus effect.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015.
3. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd

REFERENCE BOOKS:

1. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
2. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
3. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, OxfordUniversity Press, 2010
4. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai & Co
5. Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Laxmi Publication Pvt Ltd.

21CE306PC: SURVEYING LAB

B.Tech. II Year I Sem.	L	T/P/D	C
	0	0/3/0	1.5

Pre-Requisites: Surveying Theory

Course Objectives:

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.'s areas and volumes
- To set out Curves
- To stake out points
- To traverse the area
- To draw Plans and Maps

Course Outcomes: At the end of the course, the student will be able to:

- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, Drawing plans and contour maps using different measuring equipment atfield level
- Write a technical laboratory report

List of Experiments

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Determination of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using totalstation
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station
12. Setting out Curve using total station

21CE307PC: STRENGTH OF MATERIALS LAB

B.Tech. II Year I Sem.	L	T/P/D	C
	0	0/3/0	1.5

Course Objectives:

- Make measurements of different strains, stress and elastic properties of materials used inCivil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments, equipment,devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

Course Outcomes: At the end of the course the student will be able to:

- Configure & Operate a data acquisition system using various testing machines of solidmaterials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratorymeasurements.
- Write a technical laboratory report

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

21CE308PC: ENGINEERING GEOLOGY LAB

B.Tech. II Year I Sem.	L	T/P/D	C
	0	0/2/0	1

Pre-Requisites: Engineering Geology Theory

Course Objectives: The objective of this lab is that to provide practical knowledge about physicalproperties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

Course Outcomes: At the end of the course, the student will be able to:

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects andthe quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet,Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro,Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and itsvarieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schistand its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Simple structural Geology Problems (Folds, Faults & Unconformities)

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.

*21MC309/*21MC409: CONSTITUTION OF INDIA

B.Tech. II Year I Sem. **L T/P/D C**

3 0/0/0 0

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and theStates
8. Parliamentary Form of Government in India – The constitution powers and status of thePresident of India
9. Amendment of the Constitutional Powers and Procedure

10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

21EE401ES: BASIC ELECTRICAL & ELECTRONICS ENGINEERING

B.Tech. II Year II Sem. **L T/P/D C**

3 0/0/0 3

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

UNIT - I:

D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. 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 , Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - II:

ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT - III:

ELECTRICAL MACHINES

Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC

generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

UNIT - IV:

P-N JUNCTION AND ZENER DIODE: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

RECTIFIERS AND FILTERS: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT - V:

BIPOLAR JUNCTION TRANSISTOR (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

FIELD EFFECT TRANSISTOR (FET): Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6thedition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition byRaymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

21CE402ES: BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS

B.Tech. II Year II Sem.	L	T/P/D	C
	2	0/0/0	2

Course Objectives: To familiarize civil engineering students with the

- Basic machine elements,
- Sources of Energy and Power Generation,
- Various manufacturing processes,
- Power transmission elements, material handling equipment.

Course Outcome: At the end of the course Student will able

- To understand the mechanical equipment for the usage at civil engineering systems,
- To familiarize with the general principles and requirement for refrigeration, manufacturing,
- To realize the techniques employed to construct civil engineering systems.

UNIT - I:
Machine Elements: Cams: Types of cams and followers

Introduction to engineering materials-Metals, ceramics, composites-Heat treatment of metals **Riveted joints**- methods of failure of riveted joints-strength equations-efficiency of riveted joints -eccentrically loaded riveted joints.

UNIT - II:
Power Transmission Elements: Gears terminology of spur, helical and bevel gears, gear trains. Beltdrives (types). Chain drives.
Material Handling equipment: Introduction to Belt conveyors, cranes, industrial trucks, bull dozers

UNIT - III:
Energy: Power Generation: External and internal combustion engines (layouts, element/componentdescription, advantages, disadvantages, applications).
Refrigeration: Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system,details and principle of operation –calculation of COP
Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

UNIT - IV:
Manufacturing Processes: Sheet Metal Work: Introduction – Equipments – Tools and accessories –Various processes (applications, advantages / disadvantages).
Welding: Types – Equipments –Techniques employed –welding positions-defects-applications,advantages / disadvantages – Gas cutting – Brazing and soldering.
Casting: Types, equipments, applications

UNIT - V:

Machine Tools: Introduction to lathe, drilling machine, milling machine, grinding machine-Operationsperformed

TEXT BOOK:

1. Kumar, T., Leenus Jesu Martin and Murali, G., *Basic Mechanical Engineering*, Suma Publications, Chennai, 2007

REFERENCE BOOKS:

1. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., *Basic Mechanical Engineering*, SciTech Publications, Chennai, 2000.
2. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., *Elements of Workshop Technology Vols. I & II*, Indian Book Distributing Company Calcutta, 2007.
3. Nag, P.K., *Power Plant Engineering*, Tata McGraw-Hill, New Delhi, 2008.
4. Rattan, S.S., *Theory of Machines*, Tata McGraw-Hill, New Delhi, 2010.

21CE403PC: BUILDING MATERIALS, CONSTRUCTION AND PLANNING

B.Tech. II Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objectives of the course is to

- List the construction material.
- Explain different construction techniques
- Understand the building bye-laws
- Highlight the smart building materials

Course Outcomes: After the completion of the course student should be able to

- Define the Basic terminology that is used in the industry
- Categorize different building materials, properties and their uses
- Understand the Prevention of damage measures and good workmanship
- Explain different building services

UNIT - I

Stones and Bricks, Tiles: Building stones – classifications and quarrying – properties – structural requirements – dressing.

Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.
Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT - II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration -field & lab tests.
Admixtures – mineral & chemical admixtures – uses.

UNIT - III

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows – materials - types.

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire- resistant materials and constructions

UNIT - IV

Mortars, Masonry and Finishing's Mortars: Lime and Cement Mortars Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.

Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.
Form work: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT – V
Building Planning: Principles of Building Planning, Classification of buildings and Building by laws.

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - LaxmiPublications (P) ltd., New Delhi.

REFERENCE BOOKS:

1. Building Materials by Duggal, New Age International.
2. Building Materials by P. C. Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.

21CE404PC: STRENGTH OF MATERIALS – II

B.Tech. II Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Strength of Materials - I

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries shafts, springs, columns&cylindrical and spherical shells for various types of simple loads
- To calculate the stability and elastic deformation occurring in various simple geometries fordifferent types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibriumconditions in a structural member of having different axis of symmetry.

Course Outcome: On completion of the course, the student will be able to:

- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression;
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
- Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses;
- Understand and evaluate the shear center and unsymmetrical bending.
- Frame an idea to design a system, component, or process

UNIT – I

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion – Derivation of Torsion equation -Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts
– Combined bending and torsion – Design of shafts according to theories of failure.

SPRINGS: Introduction – Types of springs – deflection of close and open coiled helical springs underaxial pull and axial couple – springs in series and parallel.

UNIT – II

COLUMNS AND STRUTS: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

UNIT - III

DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bendingmoment about both axis.

UNIT – IV

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V

UNSYMMETRICAL BENDING:

Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis.

SHEAR CENTRE: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L)sections

TEXT BOOKS:

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd

21CE405PC: HYDRAULICS AND HYDRAULIC MACHINERY

B.Tech. II Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objective of the course is

- To Define the fundamental principles of water conveyance in open channels.
- To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
- To Study the characteristics of hydroelectric power plant and its components.
- To analyze and design of hydraulic machinery and its modeling

Course Outcomes: At the end of the course the student will able to

- Apply their knowledge of fluid mechanics in addressing problems in open channels andhydraulic machinery.
- Understand and solve problems in uniform, gradually and rapidly varied flows in open channelin steady state conditions.
- Apply dimensional analysis and to differentiate the model, prototype and similitude conditionsfor practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will beutilized in hydropower development and for other practical usages

UNIT - I

Open Channel Flow – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient "n". Most economical sections. Computation of Uniform flow, Normal depth.
Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

UNIT - II

Open Channel Flow – II: Non-uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method. **Rapidly varied flow:** Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT - III

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity – Rayleigh's method and Buckingham's pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow

problems. Distorted models. **Basics of Turbo Machinery:** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular

UNIT - IV

Hydraulic Turbines – I: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

Hydraulic Turbines – II: Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

UNIT - V

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015
3. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai &Co

REFERENCE BOOKS:

1. Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2. Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons Publications Pvt.Ltd.).
3. Open channel flow by V.T. Chow (McGraw Hill Book Company).
4. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
5. Hydraulic Machines by Banga & Sharma (Khanna Publishers).

21CE406PC: STRUCTURAL ANALYSIS – I

B.Tech. II Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Strength of Materials – I

Course Objectives: The objective of the course is to

- Differentiate the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged arches forvarious types of simple loads
- Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineeringproblems
- Evaluate the Influence on a beam for different static & moving loading positions

Course Outcomes: At the end of the course the student will able to

- An ability to apply knowledge of mathematics, science, and engineering
- Analyse the statically indeterminate bars and continuous beams
- Draw strength behaviour of members for static and dynamic loading.
- Calculate the stiffness parameters in beams and pin jointed trusses.
- Understand the indeterminacy aspects to consider for a total structural system.
- Identify, formulate, and solve engineering problems with real time loading

UNIT – I

ANALYSIS OF PERFECT FRAMES: Types of frames - Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT – II

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's theorem-Unit Load Method - Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

THREE HINGED ARCHES – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels.

UNIT - III

PROPPED CANTILEVER and FIXED BEAMS: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support, effectof rotation of a support.

UNIT – IV

CONTINUOUS BEAMS: Introduction-Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - effect of sinking of supports.

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports - Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

UNIT – V

MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load -Focal length.

TEXT BOOKS:

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S.Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt.Ltd.
3. Structural analysis T. S Thandavamoorthy, Oxford university Press

REFERENCE BOOKS:

1. Structural Analysis by R. C. Hibbeler, Pearson Education
2. Basic Structural Analysis by K.U. Muthu *et al.*, I.K. International Publishing House Pvt. Ltd
3. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar PublishingHouse Pvt. Ltd.
4. Basic Structural Analysis by C. S. Reddy., Tata McGraw Hill Education Pvt. Ltd.
5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd

21CE407PC: COMPUTER AIDED CIVIL ENGINEERING DRAWING

B.Tech. II Year II Sem.	L	T/P/D	C
	0	0/3/0	1.5

Course Outcomes: At the end of the course, the student will be able to:

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basicdrawing fundamentals in various civil engineering applications, specially in building drawing.

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –LaxmiPublications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

21EE409ES: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year II Sem.	L	T/P/D	C
	0	0/2/0	1

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration

5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6thedition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition byRaymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

21CE409PC: HYDRAULICS & HYDRAULIC MACHINERY LAB

B.Tech. II Year II Sem.	L	T/P/D	C
	0	0/3/0	1.5

Course Objectives

- To **identify** the behavior of analytical models introduced in lecture to the actual behavior of realfluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the Hydraulicmachines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To **analyze** the laboratory measurements and to document the results in an appropriate format.

Course Outcomes: Students who successfully complete this course will have demonstrated ability to:

- **Describe** the basic measurement techniques of fluid mechanics and its appropriate application.
- **Interpre**t the results obtained in the laboratory for various experiments.
- **Discover** the practical working of Hydraulic machines- different types of Turbines, Pumps, andother miscellaneous hydraulics machines.
- **Compare** the results of analytical models introduced in lecture to the actual behavior of realfluid flows and draw correct and sustainable conclusions.
- Write a technical laboratory report

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

*21MC409 / 21MC309: GENDER SENSITIZATION LAB

(An Activity-based Course)

B.Tech. II Year II Sem.	L	T/P/D	C
	0	0/2/0	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions aboutsex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.

- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT - I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. - Gender Development Issues-Gender, Governance and Sustainable Development-Gender and HumanRights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life"

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

21CE501PC: STRUCTURAL ANALYSIS – II

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objectives of the course are to

- Identify the various actions in arches.
- Understand classical methods of analysis for statically indeterminate structures.
- Differentiate the approximate and numerical methods of analysis for indeterminatestructures.
- Find the degree of static and kinematic indeterminacies of the structures.
- Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

Course Outcomes: After the completion of the course student should be able to

- **Analyze** the two hinged arches.
- **Solve** statically indeterminate beams and portal frames using classical methods
- **Sketch** the shear force and bending moment diagrams for indeterminate structures.
- **Formulate** the stiffness matrix and analyze the beams by matrix methods

UNIT – I

Two Hinged Arches: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shorteningof rib.

Moment Distribution Method - Analysis of continuous beams with and without settlement of supports using - Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined frames - Shear force and Bending moment diagrams, Elastic curve.

UNIT – II

Kani's Method: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway using Kani's Method - Shear forceand bending moment diagrams - Elastic curve.

cables and suspension bridges:

Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads - Length of a cable - Cable with different support levels - Suspension cable supports - Suspension Bridges - Analysis of Three Hinged Stiffening Girder Suspension Bridges.

UNIT – III

Approximate Methods Of Analysis: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method - Analysis of multi-storey frames for gravity loads

- Substitute Frame method - Analysis of Mill bents.

UNIT – IV

Matrix Methods Of Analysis: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' upto three degree of indeterminacy– Analysis of continuous

beams including settlement of supports using flexibility and stiffness methods -Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames using stiffness method - Shear force and bending moment diagrams - Elastic curve.

UNIT- V

Influence Lines For Indeterminate Beams: Introduction – influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia - influence line diagram for shear force and bending moment for propped cantilever beams.

TEXT BOOKS:

1. Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S. Pandit S.P. Gupta Tata McGraw Hill Education Pvt. Ltd.
3. Indeterminate Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt.Ltd

REFERENCE BOOKS:

1. Structural analysis T. S Thandavamoorthy, Oxford university Press
2. Mechanics of Structures Vol –II by H.J. Shah and S.B. Junnarkar, Charotar Publishing HousePvt. Ltd.
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4. Examples in Structural Analysis by William M.C. McKenzie, Taylor & Francis.
5. Structural Analysis by R. C. Hibbeler, Pearson Education
6. Structural Analysis by Devdas Menon, Narosa Publishing House.
7. Advanced Structural Analysis by A.K. Jain, Nem Chand & Bros.

21CE505PC: GEOTECHNICAL ENGINEERING

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: the objectives of the course are to

- understand the formation of soil and classification of the soils
- determine the Index & Engineering Properties of Soils
- determine the flow characteristics & stresses due to externally applied loads
- estimate the consolidation properties of soils
- estimate the shear strength and seepage loss

Course Outcomes: At the end of the course the student will able to

- Characterize and classify the soils
- Able to estimate seepage, stresses under various loading conditions and compactioncharacteristics
- Able to analyse the compressibility of the soils
- Able to understand the strength of soils under various drainage conditions

UNIT – I

Introduction: Soil formation and structure – moisture content – Mass, volume relationships – Specific Gravity-Field density by core cutter and sand replacement methods-Relative density.

Index Properties of Soils: Grain size analysis – consistency limits and indices – I.S. Classification ofsoils.

UNIT –II

Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability oflayered soils.

Effective Stress & Seepage Through Soils: Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT –III

Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

COMPACTION: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

UNIT – IV

Consolidation: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT - V

Shear Strength of Soils: Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio, Introduction to stress path method.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt Ltd,
2. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
3. Foundation Engineering by P.C. Varghese, PHI

REFERENCE BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors,Delhi.
2. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).
4. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata McGraw-Hill Publishers NewDelhi.
6. Soil Mechanics and Foundation by by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,Laxmi, publications Pvt. Ltd., New Delhi

21CE503PC: STRUCTURAL ENGINEERING – I (RCC)

B.Tech. III Year I Sem.	L	T/P/D	C
	3	1/0/0	4

Course Objectives: The objectives of the course are to

- **Identify** the basic components of any structural system and the standard loading for the RCstructure
- **Identify** and **tell** the various codal provisions given in IS. 456
- **Describe** the salient feature of limit state method, compare with other methods and theconcepts of limit state of collapse and limit state of serviceability
- **Evaluate** the behaviour of RC member under flexure, shear and compression, torsion andbond.

Course Outcomes: After the completion of the course student should be able to

- **Compare** and **Design** the singly reinforced, doubly reinforced and flanged sections.
- **Design** the axially loaded, uniaxial and biaxial bending columns.
- **Classify** the footings and **Design** the isolated square, rectangular and circular footings
- **Distinguish** and **Design** the one-way and two-way slabs.

UNIT - I

Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility– Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load– Forces – What is meant by Design? – Different types of materials – RCC, PSC and Steel – Planning of structural elements- Concepts of RCC Design – Different methods of Design- Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel- Stress Block Parameters as per IS 456 -2000.

Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II

Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sectionsfor torsion - Detailing of reinforcement

UNIT - III

Design of Two-way slabs with different end conditions, one-way slab, and continuous slab Using I S Coefficients - Design of dog-legged staircase – Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- Long column – Design of long columns - I S Code provisions.

UNIT – V

Design of foundation - Different types of footings – Design of wall footing – Design of flat isolated square,rectangular, circular footings and combined footings for two columns.

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C. Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill.
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age InternationalPublishers.

REFERENCE BOOKS:

1. Reinforced concrete structures, Vol. 1, by B.C. Punmia, Ashok Kumar Jain and Arun KumarJain, Laxmi, publications Pvt. Ltd.
2. Fundamentals of Reinforced concrete design by M. L. Gambhir, Prentice Hall of IndiaPvt.Ltd.,
3. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
4. Design of concrete structures by J.N. Bandhyopadhyay PHI Learning Private Limited.
5. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
6. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India.

21CE504PC: TRANSPORTATION ENGINEERING

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives:

This course aims at providing a comprehensive insight of various elements of Highway transportation engineering. Topics related to the highway development, characterisation of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course.

Course Outcomes: At the end of this course, the students will develop:

- An ability to apply the knowledge of mathematics, science and engineering in the areas of trafficengineering, highway development and maintenance
- An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
- An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian Roads Congress.
- An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
- An ability to assess the issues related to road traffic and provide engineering solutions supportedwith an understanding of road user psychological and behavioural patterns.

UNIT -I

Introduction, History and Importance of Highways, Characteristics of road transport, Current road development plans in India, Highway development in India, Highway planning, Highway alignment, Engineering surveys for Highway alignment, Highway projects, Highway drawings and reports, Detailed Project Report preparation, PPP schemes of Highway Development in India, Government of India initiatives in developing the highways and expressways in improving the mobility and village road development in improving the accessibility.

UNIT – II

Introduction to Highway Geometric Design; Width of Pavement, Formation and Land, Cross Slopes etc; Concept of Friction: Skid and Slip; Elements of geometric design of highways; Sight Distances: Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Horizontal alignment: Design of horizontal curves, super elevation, extra widening of pavement at curves; Vertical Alignment: Gradients, Compensation in Gradient, Design of summit curves and valley curves using different criteria; Integration of Horizontal and

Vertical Curves

UNIT - III

Basic traffic characteristics: Speed, volume and concentration, relationship between flow, speed and concentration; Highway capacity and Level of service (LOS) concepts: Factors affecting capacity and LOS, relationship between V/C ratio and LOS; Traffic volume and spot speed studies: Methods; Road Safety; Traffic Signals: Types, warrants for signalization, design of isolated traffic signal by IRC method; Parking and road accidents: Types of parking facilities – on-street and off street, introduction to parking studies; Accident studies, road safety auditing; Introduction to street lighting; Road Intersections: Design considerations of at-grade intersections, introduction to interchanges.

UNIT - IV

Tests on soils: CBR, Field CBR, modulus of sub-grade reaction, Tests on Aggregates: specific gravity, shape (flakiness and elongation indices), angularity number, water absorption, impact, abrasion, attrition, crushing resistance, durability (weathering resistance), stone polishing value of aggregates; Tests on bitumen: spot, penetration, softening point, viscosity, ductility, elastic recovery, flash and fire points, Introduction to modified bituminous binders like crumb rubber modified, natural rubber modified and polymer modified bitumen binders; Bituminous Concrete: Critical parameters controlling bituminous concrete mixture design, aggregate blending concepts viz. Rothfuch's method, trial and error procedure. Introduction to advanced concretes for road applications.

UNIT -V

Introduction to Pavement Design: Types of pavements and their typical cross sections: flexible, rigid and composite; Flexible Pavement analysis and design: Introduction to multi layered analysis, IRC 37- 2012 method of flexible pavement design; Rigid pavement analysis and design: Factors controlling rigid pavement design, types of stresses in rigid pavements, critical load positions, load stresses and temperature stresses in interior, corner and edge locations of jointed plain cement concrete pavement slabs, IRC 58-2015 method of rigid pavement design; Overlay Designs: Types of overlays on flexible and rigid pavements.

TEXT BOOKS:

1. Khanna, S.K, Justo, A and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros.Revised Tenth Edition, 2014
2. Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; Seventh Edition,First Reprint; Khanna Publishers, New Delhi, 2018

Code of Provisions:

Design Codes: IRC 37-2012, IRC 58-2015, IRC 81-1997

REFERENCE BOOKS:

1. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Edition,Third Impression; Pearson Education, 2018.

2. Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st IndianAdaptation; Pearson India Education Service Pvt. Ltd, New Delhi 2017.
3. Subhash C Saxena, Text Book of Highway and Traffic Engineering; First Edition; CBSPublishers and Distributors. New Delhi, 2014
4. C Venkatramaih, Transportation Engineering Volume 1 – Highway Engineering, 1st Edition,Universities Press, 2016
5. Garber, N.J. and Hoel, L.A. Traffic and Highway Engineering, Fourth Edition; CengageLearning, Stamford, CT, USA, 2010
6. Partha chakroborty and Animesh Das, Principles of Transportation Engineering, PHI, 2013
7. Nicholas J Garber and Lester A Hoel, Traffic and Highway Engineering, 5th Edition, CengageLearning India Private Limited, New Delhi, 5th Indian Reprint, 201

21CE511PE: CONCRETE TECHNOLOGY(Professional Elective – I)

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Building Materials

Course Objectives: The objectives of the course are to

- **Know** different types of cement as per their properties for different field applications.
- **Understand Design** economic concrete mix proportion for different exposure conditions andintended purposes.
- **Know** field and laboratory **tests** on concrete in plastic and hardened stage.

Course Outcomes: After the completion of the course student should be able to

- **Determine** the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- **Apply** the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties
- **Use** advanced laboratory techniques to characterize cement-based materials.
- **Perform** mix design and engineering properties of special concretes such as high-performanceconcrete, self-compacting concrete, and fibre reinforced concrete.

UNIT I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT - II

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing, vibration and revibration of concrete – Steps in manufacture of concrete – Quality ofmixing water.

UNIT - IV

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

TEXT BOOKS:

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCE BOOKS:

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers

IS Codes:

IS 383
IS 516
IS 10262 - 2009

21CE512PE: THEORY OF ELASTICITY (Professional Elective – I)

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Prerequisites: Strength of Materials I & II

Course Objectives:

- To Introduce fundamental elasticity model of deformation in rectangular and polar coordinate.
- To Give foundation for 2D and 3D study in solid mechanics problems.
- To Introduce to torsion and warping of prismatic structure

Course Outcomes: At the end of the course the student will able to

- The more fundamental elasticity model of deformation should replace elementary strength ofmaterial analysis.
- Able to understand theory, formulate and to present solutions to a wide class of problems in 2Dand 3D
- Acquire the foundation for advanced study in areas of solid mechanics

UNIT - I

Introduction: Elasticity - notation for forces and stress - components of stresses - components ofstrain - Hooks law. Plane stress and plane strain analysis - differential equations of equilibrium - boundary conditions – Strain Displacement Relations - compatibility equations - stress function

UNIT - II

Two dimensional problems in rectangular coordinates - solution by polynomials - Saint-Venants principle - determination of displacements - bending of simple beams – Simple Supported and Cantilever Beam.

UNIT - III

Two dimensional problems in polar coordinates - stress distribution symmetrical about an axis - pure bending of curved bars - strain components in polar coordinates - displacements for symmetrical stress distributions Edge Dislocation - general solution of two-dimensional problem in polar coordinates - application to Plates with Circular Holes – Rotating Disk. Bending of Prismatic Bars: Stress function - bending of cantilever - circular cross section - elliptical cross section - rectangular cross section.

UNIT - IV

Analysis of stress and strain in three dimensions - principal stress - stress ellipsoid - director surface - determination of principal stresses Stress Invariants - max shear stresses Stress Tensor – Strain Tensor- Homogeneous deformation - principal axes of strain-rotation. General Theorems: Differential equations of equilibrium - conditions of compatibility -

determination of displacement - equations of equilibrium in terms of displacements - principle of super position - uniqueness of solution - the reciprocal theorem Strain Energy.

UNIT - V

Torsion of Circular Shafts - Torsion of Straight Prismatic Bars – Saint Venants Method - torsion of prismatic bars - bars with elliptical cross sections - membrane analogy - torsion of a bar of narrow rectangular bars - solution of torsional problems by energy method - torsion of shafts, tubes, bars etc. Torsion of Rolled Profile Sections.

TEXT BOOKS:

1. Theory of Elasticity by Timoshenko, McGraw-Hill Publications.
2. Theory of Plasticity by J. Chakarbarthy, McGraw-Hill Publications.

REFERENCE BOOKS:

1. Theory of Elasticity by Y.C.Fung.
2. Theory of Elasticity by Gurucharan Singh.

21CE513PE: ROCK MECHANICS (Professional Elective – I)

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: the objective of the course is to

- Identify the classification of Rocks as per engineering aspects
- Explain the basic laboratory in-situ tests, strengths and its responses
- Understand Rock slopes and its failures, underground and open excavations and its requirements

Course Outcomes: At the end of the course

- Able to determine the required rock properties and classify rock mass
- Determination of bearing capacity of rocks,
- Checking the stability of slopes, and design underground and open excavation.
- The students will be able to predict strength of rock mass with respect to various CivilEngineering applications

UNIT- I

Engineering Classification of Rocks: Classification of intact rocks, Rock mass classifications, Rock Quality Designation (RQD), Rock Structure Rating (RSR), Rock Mass Rating (RMR), Norwegian Geotechnical Classification (Q-system), Strength and modulus from classifications, Classification based on strength & modulus and strength and fracture strain, Geoengineering classification.

UNIT- II

Laboratory and In-Situ Testing of Rocks: Physical properties, Compressive strength, Tensile strength, Direct shear test, Triaxial shear test, Slake durability test, Schmidt rebound hardness test, Sound velocity test, In-Situ Tests: Seismic methods, Electrical resistivity method, In situ stresses, Plate loading test, Goodman jack test, Plate jacking test, In-situ shear test, Field permeability test.

UNIT- III

Strength, Modulus and Stresses-Strain Responses of Rocks: Factors influencing rock response, Strength criteria for isotropic intact rocks, Modulus of intact rocks, effect of confining pressure, Uniaxial Compressive strength, Strength criteria for intact rocks, Strength due to induced anisotropy in rocks,. Stress Strain Models: Constitutive relationships, Elastic, Elasto-plastic, Visco-elastic, Elasto- viscoplastic stress-strain models.

UNIT- IV

Introduction to Rock Slopes: Introduction to Rock slopes, Modes of failure, Rotational failure, Plane failure, Design charts, Wedge method of analysis, Buckling failure, Toppling failure, Improvement of slope stability and protection.

UNIT- V

Underground and Open Excavations: Blasting operational planning, Explosive products, Blast Design, Underground blast design, Controlled blasting techniques, blasting damage and control, Safe practice with explosives and shots.

TEXT BOOKS:

1. Goodman – Introduction to Rock mechanics, Willey International
2. Ramamurthy, T. - Engineering in Rocks for slopes, foundations and tunnels, Prentice Hall ofIndia (2007)

REFERENCE BOOKS:

1. Jaeger, J. C. and Cook, N. G. W. – Fundamentals of Rock Mechanics, Chapman and Hall,London. (1979)
2. Hoek, E. and Brown, E. T. - Underground Excavation in Rock, Institution of Mining andMetallurgy, 1982.
3. Brady, B. H. G. and Brown, E. T. - Rock Mechanics for Underground Mining, Chapman & Hall,1993.

21SM505MS: ENGINEERING ECONOMICS AND ACCOUNTANCY

B.Tech. III Year I Sem.	L	T/P/D	C
	2	0/0/0	2

Course Objective: To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance ofcompanies engaged in engineering.

Course Outcome: To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.

UNIT- I:
Introduction to Engineering Economics- Basic Principles and Methodology of Engineering Economics– Fundamental Concepts- Demand – Demand Determinants - Law of Demand- Demand Forecasting and Methods- Elasticity of Demand- Theory of Firm – Supply- Elasticity of Supply.

UNIT- II:
Macroeconomic Concepts: National Income Accounting - Methods of Estimation- Various Concepts of National Income - Inflation – Definition – Causes of Inflation and Measures to Control Inflation - New Economic Policy 1991 (Industrial policy, Trade policy, and Fiscal policy) Impact on Industry.

UNIT- III:
Cash Flows and Capital Budgeting: Significance of Capital Budgeting - Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index.

UNIT- IV:
Borrowings on Investment: Equity Vs Debt Financing- Leverages- Concept of Leverage- Types of Leverages: Operating Leverage- Financial Leverage and Composite Leverage. (Simple Problems)

UNIT- V:
Introduction to Accounting: Accounting Principles- procedure- Double entry system - Journal- ledger- Trial balance- Trading and Profit and Loss account- Balance Sheet. Cost Accounting, Introduction- Classification of costs- Breakeven Analysis, Meaning and its application, Limitations. (Simple Problems).

TEXT BOOKS:

1. Henry Malcom Steinar-Engineering Economics, Principles, McGraw Hill Pub.

2. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, InternationalBook House Pvt. Ltd. 2013.
3. Jain and Narang" Accounting, Kalyani Publishers.
4. Arora, M.N." Cost Accounting, Vikas Publication.
5. S. N. Maheshwari, Financial Management, Vikas Publishing House.
6. Zahid A Khan, Arshad N Siddique, et.al, Principles of Engineering Economics with Applications,2e, Cambridge University Press.

21CE506PC: HIGHWAY ENGINEERING & CONCRETE TECHNOLOGY LAB

B.Tech. III Year I Sem.	L	T/P/D	C
	0	0/3/0	1.5

Pre-Requisites: Building Materials, Concrete Technology, Highway Materials

Course Objectives: The objectives of the course are to

- To learn laboratory tests and their procedures cement, fine aggregate, course aggregates andbitumen
- To Evaluate fresh concrete properties
- To Understand the test procedures for characterization of Concrete and bituminous mixes

Course Outcomes: Student shall be able to

- Categorize the test on materials used Civil Engineering Building & Pavement constructions
- To perform the tests on concrete for it characterization.
- To Design Concrete Mix Proportioning by Using Indian Standard Method.
- Examine the tests performed for Bitumen mixes.
- To prepare a laboratory report

I. Test on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement
5. Compressive strength of cement
6. Workability test on concrete by compaction factor, slump and Vee-bee.

II. Test on Aggregates (Coarse and Fine)

1. Specific gravity (Pycnometer and wire basket), water absorption
2. Shape (Flakiness and elongation indices)
3. Impact and abrasion value tests
4. Crushing resistance and durability tests
5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)
6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates

III. Test on Fresh Concrete

1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

IV. Test on hardened concrete

1. Compression test on cubes & Cylinders
2. Flexure test
3. Split Tension Test
4. Modulus of Elasticity

V. Tests on Bitumen and Bituminous concrete

1. Penetration, softening point and spot test
2. Ductility, Elastic recovery and viscosity
3. Flash and fire points and specific gravity
4. Marshall's Stability (sample preparation and testing for stability and flow values)

TEXT BOOKS:

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers

IS CODES:

1. IS 10262 :2009 "Concrete Mix Proportioning – Guidelines"
2. 1S 516:2006 "Methods of Tests on Strength of Concrete"
3. IS 383 :1993 "Specification For Coarse And Fine Aggregates From Natural Sources ForConcrete"
4. 1S 1201 -1220 (1978) "Methods for testing tars and bituminous materials"
5. IRC SP 53 -2010 "Guidelines on use of modified bitumen"
6. MS-2 Manual for Marshalls Mix design 2002

21CE507PC: GEOTECHNICAL ENGINEERING LAB

B.Tech. III Year I Sem.	L	T/P/D	C
	0	0/3/0	1.5

Pre-Requisites: Soil Mechanics (Co-requisite)

Course Objectives: To obtain index and engineering properties of locally available soils, and tounderstand the behavior of these soil under various loads.

Course Outcomes: At the end of the course, the student will be able to Classify and evaluate thebehavior of the soils subjected to various loads.

LIST OF EXPERIMENTS

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Field density by core cutter method and
   b) Field density by sand replacement method
3. Determination of Specific gravity of soil Grain size distribution by sieve analysis
4. Permeability of soil by constant and variable head test methods
5. Standard Proctor's Compaction Test
6. Determination of Coefficient of consolidation (square root time fitting method)
7. Unconfined compression test
8. Direct shear test
9. Vane shear test
10. Differential free swell index (DFSI) test

REFERENCE:

1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, NewAge International

21EN508HS: ADVANCE COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem. **L T/P/D C**

0 0/2/0 1

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language

   – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effectivegoogling.

3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and MockInterviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructuralfacilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5thEdition.

REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press2009.

4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012.Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata McGraw-Hill 2009.

*21CEMC509: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem.	L	T/P/D	C
	3	0/0/0	0

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter,selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd

21CE601PC: HYDROLOGY AND WATER RESOURCES ENGINEERING

B.Tech. III Year II Sem. **L T/P/D C**

3 1/0/0 4

Course Objectives: This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle. and its components. Further it will explain the water requirement for irrigation and connectivity of hydrology tothe field requirement.

Course Outcomes: At the end of the course the student will be able to

- Understand the different concepts and terms used in engineering hydrology
- To **identify and** explain various formulae used in estimation of surface and Ground waterhydrology components
- Demonstrate their knowledge to **connect** hydrology to the field requirement

UNIT - I

Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data.

Precipitation

Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Arithmetic,Theissen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship,Probable Maximum Precipitation (PMP), rainfall data in India.

UNIT - II

Abstractions from precipitation

evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, , interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff

Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flowduration curves, Mass curve of runoff – Analysis.

UNIT - III

Hydrographs

Hydrograph –Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective

Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT - IV
Groundwater Hydrology

Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. **Well Hydraulics -** Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.
Crop Water Requirements – Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

UNIT - V
Canal Systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Regime channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals-Types of lining-Advantages and disadvantages. Drainage of irrigated lands-necessity, methods.

TEXT BOOKS:

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers
3. G L Asawa, Irrigation Engineering, Wiley Eastern

REFERENCE BOOKS:

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International)

21CE602PC: ENVIRONMENTAL ENGINEERING

B.Tech. III Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics ofwaste water, sludge digestion are also included.

Course Outcomes: At the end of the course, the student will be able to:

- Assess characteristics of water and wastewater and their impacts
- Estimate quantities of water and waste water and plan conveyance components
- Design components of water and waste water treatment plants
- Be conversant with issues of air pollution and control

UNIT – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries.

UNIT – II

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

UNIT - III

characteristics of sewage –waste water collection–Estimation of waste water and storm water – decomposition of sewage, examination of sewage – B.O.D. Equation – C.O.D. Design of sewers – shapes and materials – sewer appurtenances, manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing **–** ultimate disposal of sewage – sewage farming –self-purification of rivers.

UNIT – IV

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters – ASP– Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

UNIT – V

Air pollution– classification of air pollution– Effects air pollution–Global effects– Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior – Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control.

TEXT BOOKS:

1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw HillEducation (India) Pvt Ltd, 2014
2. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
3. Environmental Engineering, I and II by BC Punmia, Std. Publications.
4. Environmental Engineering, I and II by SK Garg, Khanna Publications.
5. Environmental Pollution and Control Engineering CS Rao,Wiley Publications

REFERENCE BOOKS:

1. Water and Waste Water Technology by Steel, Wiley
2. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
3. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
4. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.Wiley, 2007.
5. Introduction to Environmental Engineering and Science by Gilbert Masters, PrenticeHall,
   New Jersey.
6. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan,Thompson /Brooks/Cole; Second Edition 2008.
7. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw HillPublication

21CE603PC: FOUNDATION ENGINEERING

B.Tech. III Year II Sem. **L T/P/D C**

3 0/0/0 3

Course Objectives:

- To Plan Soil exploration programme for civil Engineering Projects
- To check the stability of slopes
- To determine the lateral earth pressures and design retaining walls
- To determine the Bearing capacity of Soil
- To design pile group foundation

Course Outcomes: At the end of the course the student will able to

- understand the principles and methods of Geotechnical Exploration
- decide the suitability of soils and check the stability of slopes
- calculate lateral earth pressures and check the stability of retaining walls
- analyse and design the shallow and deep foundations

UNIT – I

SOIL EXPLORATION: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test– planning of soil exploration programme, Bore logs and preparation of soil investigation report.

UNIT – II

SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices Taylor's Stability Number- stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Active, Passive and at rest soil pressures Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory.

RETAINING WALLS: Types of retaining walls – stability of gravity and cantilever retaining walls againstoverturning, sliding and, bearing capacity, filter material for drainage.

UNIT – IV

SHALLOW FOUNDATIONS - Types - choice of foundation – location and depth - safe bearing capacity shear criteria – Terzaghi's, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

UNIT - V

PILE FOUNDATION: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction

TEXT BOOKS:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt .Ltd, New Delhi
2. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.

REFERENCE BOOKS:

1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company PvtLtd (1998).
5. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishingcompany New Delhi. 2005.
6. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishingcompany, Newyork.

21CE604PC: STRUCTURAL ENGINEERING – II (STEEL)

B.Tech. III Year II Sem.	L	T/P/D	C
	3	1/0/0	4

Course Objectives: The objectives of the course is to

- Explain the mechanical properties of structural steel, plasticity, yield.
- **Describe** the salient features of Limit State Method of design of Steel structures.
- **Identify** and **explain** the codal provisions given in IS. 800.
- **Analyze** the behaviour of steel structures under tension, compression and flexure.
- **Design** the tension, compression, flexural members and plate girder
- Design the connection in steel structure, build - up member and (bolted and welded).

Course Outcomes: After the completion of the course student should be able to

- Analyze the tension members, compression members.
- Design the tension members, compression members and column bases and joints andconnections
- Analyze and Design the beams including built-up sections and beam and connections.
- Identify and Design the various components of welded plate girder including stiffeners

UNIT – I

Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths - deflection limits
– serviceability – stability check.

Design of Connections– Different types of connections – Bolted connections – Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements
- Design of Beam-column connections - Eccentric connections - Type I and Type II connection – Framedconnection– stiffened / seated connection.

UNIT – II

Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle.

Design of compression members – Buckling class – slenderness ratio – Design of simple compressionmembers - laced – battened columns – splice – column base – slab base.

UNIT – III

Plastic Analysis;Plastic moment – Plastic section modulus - Plastic analysis of continuous beams Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterallysupported beams - Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice.

UNIT – V

Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlin design –truss design – Design of welded Gantry girder

Note: Design of structural members include detailed sketches.

TEXT BOOKS:

1. Design of steel structures by S.K.Duggal,Tata Macgrawhill publishers,2000,2nd Edition.
2. Design of steel structures by N.Subramanian,Oxford University press,2008.
3. Design of steel structures by K.S.Sairam,Pearson Educational India, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Design of steel structures by Edwin H.Gayrold and Charles Gayrold,Tata Mac-grawhillpublishers,1972
2. Design of steel structures by L.S.JayaGopal,D.Tensing,Vikas Publishing House.

21CE611PE: PRESTRESSED CONCRETE (Professional Elective – II)

B.Tech. III Year II Sem. **L T/P/D C**

3 0/0/0 3

Pre-Requisites: **Reinforced Concrete Design**

Course Objectives: The objectives of the course are to

- Understand the principles & necessity of prestressed concrete structures.
- Know different techniques of prestressing.
- Get the knowledge on various losses of prestress.
- Understand Analysis and design of prestressed concrete members.

Course Outcomes: After the completion of the course student should be able to

- Acquire the knowledge of evolution of process of prestressing.
- Acquire the knowledge of various prestressing techniques.
- Develop skills in analysis design of prestressed structural elements as per the IS codalprovisions

UNIT - I:

Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT - II:

Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.**Losses of Prestress:** Loss of prestress in pretensioned and posttesnioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT - III:

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections- Kern line – Cable profile and cable layout.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions**.**

UNIT - IV:

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by

Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS Provisions

UNIT - V:

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

REFERENCE BOOKS:

1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book – Co. New Delhi.
2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
4. Prestressed Concrete by N. Rajagopalan Narosa Publishing House

21CE612PE: ELEMENTS OF EARTHQUAKE ENGINEERING (Professional Elective – II)

B.Tech. III Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Structual Engineering –II & RC Design

Course Objectives: The objectives of the course are to

- Understand Engineering Seismology
- Explain and discuss single degree of freedom systems subjected to free and forced vibrations
- Acquire the knowledge of the conceptual design and principles of earthquake resistantdesigns as per IS codes
- understand importance of ductile detailing of RC structures

Course Outcomes: After the completion of the course student should be able to

- Explain and derive fundamental equations in structural dynamics
- Discuss and explain causes and Theories on earthquake, seismic waves, measurement ofearthquakes
- Evaluate base shear using IS methods
- Design and Detail the reinforcement for earthquake forces

UNIT - I

Engineering Seismology: Earthquake phenomenon - cause of earthquakes-Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales- Energy Released-Earthquake measuring instruments seismogram - Seismoscope, Seismograph, - strong ground motions- Seismic zones of India.

Theory of Vibrations: Elements of a v ibratory system- Degrees of Freedom-Continuous system- Lumped mass idealization-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- undamped and damped-critical damping-Logarithmic decrement-Forced vibrations-Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

UNIT - II

Conceptual design: Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical Members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

UNIT - III

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings - Seismic methods of analysis- IS code based methods for seismic design

- Vertical irregularities - Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces as per IS 1893 (Part-1):2016- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT - IV

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - V

Structural Walls and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of non- structures- Effects of non-structural elements on structural system- Analysis of non-structural elements-Prevention of non-structural damage

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920-2016 - Behaviour of beams, columns and joints in RC buildingsduring earthquakes

TEXT BOOKS:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, PrenticeHall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly,John Wiley & Sons.
2. Eartquake Resistant Design of Buidling structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nemchand & Bros
5. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy

BIS Codes: 1. IS 1893(Part-1):2016. 2. IS 13920:2016. 3. IS 4326. 4. IS 456:200

21CE613PE: ADVANCED STRUCTURAL ANALYSIS (Professional Elective – II)

B.Tech. III Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objectives of the course are to

- Understand the matrix method of analysis statically indeterminate frames and trusses.
- Know the transformation of coordinates and assembly of stiffness matrices
- Differentiate between flexibility and stiffness methods of analysis of beams, frames and planetrusses
- Understand the structural behavior of large frames with or without shear walls

Course Outcomes: After the completion of the course student should be able to

- Analyze the multistory building frames by various approximate methods.
- Solve the continuous beams, portal frames by matrix methods of analysis.
- Analyze and design of large frames with or without shear walls

UNIT- I

Introduction to matrix methods of analysis statically indeterminacy and kinematics indeterminacy- degree of freedom-coordinate system-structure idealization stiffness and flexibility matrices-suitability element stiffness equations-elements flexibility equations-mixed force-displacement equations-for trusselement, beam element and tensional element Transformation of coordinates-element stiffness matrix-and load vector-local and global coordinates.

UNIT- II

Assembly of stiffness matrix from element stiffness matrix-direct stiffness method-general procedure-bank matrix-semi bandwidth-computer algorithm for assembly by direct stiffness matrix method.

UNIT- III

Analysis of plane truss-continuous beam-plane frame and grids by Flexible methods.

UNIT- IV

Analysis of plane truss-continuous beam-plane frame and grids by stiffness methods.

UNIT- V

Special analysis procedures-static condensation and sub structuring-initial and thermal stresses. Shear Walls Necessity-structural behavior of large frames with and without shear walls-approximatemethods of analysis of shear walls.

TEXT BOOKS:

1. Matrix methods of structural analysis by Willam Weaver and gere, CBS Publishers.

2. Advanced Structural Analysis by A.K. Jain Nemchand Publishers

REFERENCE BOOKS:

1. Advanced Structural Analysis by Devdas Menon, Narosa publishing house.
2. Matrix methods of structural analysis by Pandit and gupta
3. Matrix methods of structural analysis by J Meek
4. Structural Analysis by Ghali and Neyveli

21CE605PC: ENVIRONMENTAL ENGINEERING LAB

B.Tech. III Year II Sem.	L	T/P/D	C
	0	0/2/0	1

Course Objectives: the objectives of the course are to

- **Perform** the experiments to determine water and waste water quality
- **Understand** the water & waste water sampling, their quality standards
- **Estimate** quality of water, waste water, Industrial water

Course outcomes: After the completion of the course student should be able to

- Understand about the equipment used to conduct the test procedures
- Perform the experiments in the lab
- Examine and Estimate water, waste water, air and soil Quality
- Compare the water, air quality standards with prescribed standards set by the localgovernments
- Develop a report on the quality aspect of the environment

Practical Work: List of Experiments

1. Determination of pH
2. Determination of Electrical Conductivity
3. Determination of Total Solids (Organic and inorganic)
4. Determination of Acidity
5. Determination of Alkalinity
6. Determination of Hardness (Total, Calcium and Magnesium Hardness)
7. Determination of Chlorides
8. Determination of optimum coagulant Dosage
9. Determination of Dissolved Oxygen (Winkler Method)
10. Determination of COD
11. Determination of BOD/DO
12. Determination of Residual Chlorine
13. Total count No.
14. Noise level measurement

TEXT/REFERENCE BOOKS:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall,New Jersey.
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan,Thompson / Brooks/ Cole; Second Edition 2008.
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - HillInternational Editions, New York 1985.
4. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
5. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
6. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999

7. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw HillPublication
8. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central PublicHealth and Environmental Engineering Organization, Ministry of Urban Development.

21CE606PC: COMPUTER AIDED DESIGN LAB

B.Tech. III Year II Sem.	L	T/P/D	C
	0	0/2/0	1

Pre-Requisites: Computer Aided Civil Engineering Drawing or AUTO CAD Principles – Excel-Structural Engineering -1 & 2

Course Objectives: The objectives of the course are to

- Learn the usage of any fundamental software for design
- Create geometries using pre-processor
- Analyse and Interpret the results using post processor
- Design the structural elements

Course Outcomes: After the completion of the course student should be able to

- Model the geometry of real-world structure Represent the physical model of structuralelement/structure
- Perform analysis
- Interpret from the Post processing results
- Design the structural elements and a system as per IS Codes

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL,LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design programme for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designingsoftware's.

*21MC609: ENVIRONMENTAL SCIENCE

B.Tech. III Year II Sem. **L T/P/D C**

3 0/0/0 0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT - I

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics

of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversity Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivate Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

21CE701PC: ESTIMATION, COSTING AND PROJECT MANAGEMENT

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	1/0/0	4

Course Objectives: The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works andbasics of planning tools for a construction projects.

Course Outcomes: On completion of the course, the students will be able to:

- understand the technical specifications for various works to be performed for a project andhow they impact the cost of a structure.
- quantify the worth of a structure by evaluating quantities of constituents, derive their costrates and build up the overall cost of the structure.
- understand how competitive bidding works and how to submit a competitive bid proposal.
- An idea of how to optimize construction projects based on costs
- An idea how construction projects are administered with respect to contract structures andissues.
- An ability to put forward ideas and understandings to others with effective communicationprocesses

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed andabstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings

UNIT – II

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT – III

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT- IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standardspecifications for different items of building construction.

UNIT- V

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values,

critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three-time estimates, analysis, slack computations, calculation of probability of completion

NOTE: NUMBER OF EXERCISES PROPOSED:

1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

TEXT BOOKS:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications,2016
4. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014

REFERENCE BOOKS:

1. Standard Schedule of rates and standard data book by public works department.
2. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works
   – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson EducationIndia, 2015

21CE711PE: REMOTE SENSING & GIS (PE – III)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives:

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digitalimages
- know the concept of Geographical Information System (GIS), coordinate system GIS Dataand its types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

Course Outcomes: After the completion of the course student should be able to

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- **Understand the applicability of** RS and GIS for various applications.

UNIT - I:

Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, typesof sensors. Remote Sensing Platforms and Sensors, IRS satellites.
Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT - II:

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing,

UNIT - III:

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization **Data models and data structures:** Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT - IV:

Spatial Data input and Editing: Data input methods – keyboard entry, digitization,

scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS. **Spatial Analysis:** Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques

UNIT - V: Implementing a GIS and Applications

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems,decision making using GIS

Applications of GIS: GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

TEXT BOOKS:

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw Hill Education(Indian Edition), 7th Edition, 2015.
3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, WileyPublishers, 2012.

REFERENCE BOOKS:

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer, WileyPublishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication,3rd Edition, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. SathiKumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy.

21CE712PE: GROUND IMPROVEMENT TECHNIQUES (PE – III)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Prerequisites: Geo-Technical Engineering, Foundation Engineering

Course Objectives:

- To know the need of ground improvement
- To acquire the knowledge on the various ground improvement techniques available and theirapplications for different types of soils
- To understand suitable ground improvement technique for given soil conditions.

Course Outcomes: at the end of the course the student able to

- Know the necessity of ground improvement
- Understand the various ground improvement techniques available
- Select & design suitable ground improvement technique for existing soil conditions in the field

UNIT - I:

Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical,Electrical, Thermal methods, and their applications.

UNIT - II:

Mechanical Modification: Shallow Compaction Techniques- Deep Compaction Techniques-Blasting-Vibrocompaction- Dynamic Tamping and Compaction piles.

UNIT - III:

Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering-Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains,

UNIT - IV:

Physical and Chemical Modification – Modification by admixtures, Modification Grouting, Introductionto Thermal Modification including freezing.

UNIT - V:

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

TEXT BOOKS:

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hillpublications
2. M. P. Moseley and K. Krisch (2006) – Ground Improvement, II Edition, Taylor and Francis

REFERENCE BOOKS:

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley & Sons,1994.
4. K. Krisch & F. Krisch (2010) - Ground Improvement by Deep Vibratory Methods, Spon Press,Taylor and Francis
5. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indianedition, 2012.

21CE713PE: ADVANCED STRUCTURAL DESIGN (PE – III)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Prerequisites: Structural Engineering I(RCC) & II(STEEL) and Structural analysis

Course Objective: To make the student more conversant with the design principles of criticalstructures using limit state approach

Course Outcomes: At the end of the course the student will able to:

- Enhance the capabilities to design the special structural elements as per Indian standard codeof practice.
- Analyze, design, draw and detailing of critical structural components with a level of accuracy

UNIT – I

Design and Detailing of cantilever type of Retaining walls – Stability Check. Principles& Design of Counter fort Retaining walls.

UNIT – II

Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears **Ribbed slabs:** Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.

UNIT – III

Design of RCC Circular Water Tanks.

UNIT – IV

Introduction - Definition and basic forms – Components of a bridge - Classification of bridges – IRC Loading Standards and specifications - Design of Reinforced Concrete Slab Bridge decks

UNIT – V

Design of Steel Gantry Girders.

TEXT BOOKS:

1. Advanced RCC by Krishnam Raju, CBS Publishers & distributors, New Delhi.
2. Advanced RCC by Varghese, PHI Publications, New Delhi.
3. Structural Design and drawing (RCC and steel) by Krishnam Raju, Univ. Press, New Delhi
4. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi

Publications, New Delhi

REFERENCE BOOKS:

1. RCC Designs by Sushil Kumar, standard publishing house.
2. Fundamentals of RCC by N.C. Sinha and S.K. Roy, S. Chand Publications, New Delhi.
3. N. Krishna Raju, Design of Bridges, Oxford & IBH Publishing Company Pvt. Ltd, New Delhi.Fourth edition 2009.

21CE721PE: IRRIGATION AND HYDRAULIC STRUCTURES (PE – IV)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Hydraulics, Hydrology &Water Resources Engineering

Course Objectives: To study various types of storage works and, diversion headwork, their components and design principles for their construction.

Course Outcomes: At the end of the course, the student will be able to:

- Know types of water retaining structures for multiple purposes and its key parametersconsidered for planning and designing
- Understand details in any Irrigation System and its requirements
- Know, Analyze and Design of a irrigation system components

UNIT - I

Storage Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve-Reservoir Sedimentation
– Life of Reservoir. Types of dams, factors affecting selection of type of dam, factors governing selectionof site for a dam.

UNIT - II

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile, and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

UNIT- III

Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage. Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

UNIT- IV

Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations, -Silt Ejectorsand Silt Excluders
Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT- V

Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, principles of design of cross and distributary head regulators, types of Canalescapes - types of canal modules, proportionality, sensitivity, setting and flexibility. Cross Drainageworks: types, selection of suitable type, various types, design considerations for cross drainage works

TEXT BOOKS:

1. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg, Khanna Publishers.
2. Irrigation engineering by K. R. Arora Standard Publishers.
3. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., NewDelhi

REFERENCE BOOKS:

1. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
2. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers 2015.
3. Irrigation Theory and Practice by A. M. Micheal Vikas Publishing House 2015.
4. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.

21CE722PE: PIPELINE ENGINEERING (PE – IV)

B.Tech. IV Year I Sem. **L T/P/D C**

3 0/0/0 3

Pre-Requisites: Fluid Mechanics, Hydraulics and Hydraulic machinery

Course Objectives:

- To familiarize the students with the various elements and stages involved in transportationof water.
- To understand standards and practices in piping design.
- To know various equipment and their operation in pipeline transportation.
- To understand technology in transportation of fluids.

Course Outcome: At the end of the course the student will able to:

- Get an understanding of the key steps in a pipeline's lifecycle: design, construction, installation,asset management and maintenance.

UNIT - I

Elements of pipeline design: Types of piping systems; transmission lines, In-plant piping systems, Distribution mains, Service lines. Types of Water distribution networks; serial networks, branched networks and looped networks. Network components and Network model. Basic hydraulic principles; continuity and Energy principle.

Pipeline route selection, survey and geotechnical guidelines: Introduction - Preliminary route selection - Key factors for route selection - Engineering survey - Legal survey - Construction / As-builtsurvey - Geotechnical design.

UNIT – II

Frictional Head loss in Pipes: Major and Minor losses, Artificially roughened pipes, moody Diagram. Friction coefficient relationships, Empirical formulae, Simple pipe flow problems Equivalent pipes; pipes in series, parallel, series-parallel; problems. Water Hammer and energy transmission through pipes: gradual and Instantaneous closure

UNIT– III

Reservoirs, Pumps and Valves: Types of Reservoirs, Pumps; introduction, system head-discharge- pump head and head-discharge relationships, characteristic curves, pump combination. Valves: check valves, flow control valves, Pressure Reducing valves, both Flow control and Pressure Reducing Valves.

Network Parameters and Types of analysis: Network parameters, Parameter interrelationships, Necessity of Analysis, common Assumptions, types of analysis, rules for Solvability of Pipe networks.

UNIT – IV

Network Formulation of Equations: States of parameters, Single-Source Networks with

known pipe Resistances. Multisource Networks with known pipes resistances. Networks with unknown pipe resistances. Inclusion of Pumps, Check Valves, Flow Control Valves and Pressure Reducing Valves –Problems.
Hardy Cross Method: Methods of balancing heads (Loop Method). Method of Balancing Flows (Node Method). Modified Hardy Cross Method. Convergence Problem. Different software for WDN analysis and design.

UNIT - V

Materials selection and quality management: Elements of design – Materials designation standards Quality management.

Pipeline construction: Construction – Commissioning.

Pipeline protection, Instrumentation, pigging & Operations: Pipeline coating – Cathodic protection

– Cathodic protection calculations for land pipelines – Internal corrosion – Flow meters and theircalibration – Sensors – Pigs-Pipeline Operations and maintenance.

TEXT BOOKS:

1. Analysis of Water Distribution Networks, P.R. Bhave and R. Gupta, Narosa Publishing HousePvt. Ltd.
2. Pipeline Engineering, Henry Liu, Lewis Publishers (CRC Press), 2003.
3. Piping and Pipeline Engineering: Design, Construction, Maintenance Integrityand Repair, George A. Antaki, CRC Press, 2003.

REFERENCE BOOKS:

1. Piping Calculation Manual, E. Shashi Menon, McGraw-Hill, 2004.
2. Pipeline Rules of Thumb Handbook, E. W. McAllister, 7^{th} Edition, 2009.
3. Liquid Pipeline Hydraulics, E. Shashi Menon, Mareel Dekker Inc., 2004.

21CE723PE: GROUND WATER HYDROLOGY (PE – IV)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-Requisites: Hydraulics & Fluid Mechanics

Course objectives: The objectives of the course are:

- **To explain** the concepts of Groundwater Development and Management.
- To **demonstrate and** derive the basic equations used in Groundwater development andmanagement and the corresponding equations
- To know the investigations, field studies to conduct basic ground water studies.

Course Outcomes: On successful completion of this course, students should be able to:

- **Identify** different fundamental equations and concepts as applied in the Groundwater studies
- **Discuss** and derive differential equation governing groundwater flow in three dimensions
- To **solve** groundwater mathematical equations and analyze pumping tests in steady and non-steady flow cases
- **Distinguish** and understand the saline water intrusion problem in costal aquifers

UNIT- I
Ground Water Occurrence

Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, Vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as aquifers, types of aquifers, porosity, specific yield and specific retention. Ground Water Movement-Permeability, Darcy's law, storage coefficient, Transmissivity, Differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system, ground water flowcontours and their applications.

UNIT- II
Analysis of Pumping Test Data-I

Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, assumptions, formation constants, yield of an open well interface and well tests.

UNIT- III
Analysis of Pumping Test Data-II

Unsteady flow towards well-Non-Equilibrium equations, Thesis solution, Jocob and Chow's simplifications, Leak aquifers.

UNIT- IV
Surface and sub-surface Investigation

surface methods of exploration-Electrical resistivity method and Seismic refraction methods. Subsurface methods geophysical logging and resistivity logging. Concept of artificial recharge of ground water, recharge methods, Applications of GIS and RS in artificial recharge of ground water along with case studies.

UNIT- V

Saline water intrusion in aquifer

Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of water intrusion. Ground water basin management-case studies.

TEXT BOOKS

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Ground water by H.M. Raghunath, Wiley Eastern Ltd.
3. Groundwater System Planning & Management, R. Willes & W.W.G. Yeh, Prentice Hall.

REFERENCE BOOKS:

1. Ground water by Bawvwr, John Wiley & Sons.
2. Applied Hydrogeology by C.W. Fetta, CBS Publishers & Distributors.
3. Ground Water Assessment, Development and Management by K R Karanth, McGraw HillPublications.

21CE811PE: SOLID WASTE MANAGEMENT (PE – V)

B.Tech. IV Year II Sem. **L T/P/D C**

3 0/0/0 3

Course Objectives: The objectives of the course are to

- **Define** the terms **and Understands** the necessity of solid waste management
- **Explain** the strategies for the collection of solid waste
- **Describe** the solid waste disposal methods
- **Categorize** Hazardous Waste

Course Outcomes: At the end of the course the student will able to:

- Identify the physical and chemical composition of solid wastes
- Analyze the functional elements for solid waste management.
- Understand the techniques and methods used in transformation, conservation, and recovery ofmaterials from solid wastes.
- Identify and design waste disposal systems

UNIT- I

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT - II

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques;

UNIT- III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

UNIT- IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT- V

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E-waste management, Nuclear Wastes, Industrial waste

Management

TEXT BOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA ‘Integrated Solid Waste Management, EngineeringPrinciples and Management Issues’ McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, ‘Solid Waste Engineering’ Brooks/Cole ThomsonLearning Inc., 2002.

REFERENCE BOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, ‘Environmental Engineering’, McGraw HillInc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, ‘Geotechnical Aspects of Landfill Design andConstruction’ Prentice Hall, 2002.

21CE812PE: ENVIRONMENTAL IMPACT ASSESSMENT (PE – V)

B.Tech. IV Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objectives of the course are to

- **Define and Classify** Environmental Impacts and the terminology
- **Understands** the environmental Impact assessment procedure
- **Explain** the EIA methodology
- **List and describe** environmental audits

Course Outcomes: At the end of the course the student will be able to

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans

UNIT- I

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT- II

EIA Methodologies: Environmental attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT- III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT- IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste

management rules.
Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

UNIT- V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S.Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand ReinholdCo., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., NewYork, 1996.

21CE813PE: AIR POLLUTION (PE – V)

B.Tech. IV Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: The objectives of the course are to

- **Understand the** Air pollution Concepts
- **Identify** the source of air pollution
- **Know** Air pollution Control devices
- **Distinguish the** Air quality monitoring devices

Course Outcomes: At the end of the course the student will be able to

- Identify sampling and analysis techniques for air quality assessment
- Describe the plume behavior for atmospheric stability conditions
- Apply plume dispersion modelling and assess the concentrations
- Design air pollution controlling devices

UNIT- I

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution - Global effects – Ambient Air Quality and standards – Monitoring air pollution, Sampling and analysis of Pollutants in ambient air - Stack sampling.

UNIT- II

Meteorology and Air Pollution: Factors influencing air pollution, Wind rose, Mixing Depths, Lapse rates and dispersion - Atmospheric stability, Plume behavoiur, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

UNIT- III

Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

UNIT- IV

Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods - Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.

UNIT- V

Automobile and Indoor Pollution: Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and aircleaning systems-indoor air quality.

TEXT BOOKS:

1. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.

REFERENCE BOOKS:

1. Air Pollution Control Engineering by Nevers, , McGraw-Hill, Inc., 2000.
2. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.
3. Air Pollution and Health by T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. Maynardpublisher Academic Press.

21CE821PE: AIRPORT, RAILWAYS, AND WATERWAYS (PE – VI)

B.Tech. IV Year II Sem.	L	T/P/D	C
	3	0/0/0	3

Course Objectives: the objectives of the course are to

- Deal with the characteristics of aircrafts related to airport design; runway and taxiway design,runway orientation, length, grading and drainage.
- Introduce component of railway tracks, train resistance, crossing, signaling, high speed tracksand Metro Rail.
- Explain the classes of harbors, features, planning and design of port facilities.

Course Outcomes: At the end of this course, the students will develop:

- An ability to design of runways and taxiways.
- An ability to design the infrastructure for large and small airports
- An ability to design various crossings and signals in Railway Projects.
- An ability plan the harbors and ports projects including the infrastructure required for newports and harbors.

UNIT – I

Airport Engineering: Introduction to Air Transportation - Aircraft Characteristics - Factors Affecting Selection of site for Airport – Aprons – Taxiway – Hanger – Geometric design - Computation of Runway Length, Correction for Runway Length, Orientation of Runway, Wind Rose Diagram

UNIT - II

Introduction to Railways: Role of Indian Railways in national development – Railways for Urban Transportation – LRT , Mono Rail, Metro Rail & MRTS. Permanent Way: Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density – Functions, Materials, Ballast, Subgrade and Embankments, Ballast less Tracks.

UNIT – III

Geometric Design of Railway Track: Gradients and Grade Compensation, Super-Elevation, Wideningof Gauges in Curves, Transition Curves, Horizontal/Vertical Curves.

UNIT – IV

Track maintenance and Operation: Points and Crossings - Turnouts, Stations and Yards - Level Crossings. Signaling and Interlocking - Track Circuiting - Track Maintenance.

UNIT – V

Dock & Harbour Engineering: Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification.

Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals. Docks and repair facilities: design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials.

TEXT BOOKS:

1. Venkataramaiah C(2016), "Transportation Engineering Vol II – Railways, Airports, Docks,Harbors, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad
2. J S Mundrey, Railway Track Engineering (5th Edition) McGraw Hill Education 2017

REFERENCE BOOKS:

1. Subhash C. Saxena (2008) Airport Engineering, Planning and Design, CBS Publishers andDistributors, New Delhi. (Reprint 2015)
2. R. Srinivasan (2016), Harbour, Dock and Tunnel Engineering 28th Edition, Charotar PublishingHouse Pvt. Ltd.
3. Saxena SC and Arora S C (2010) A Text Book of Railway Engineering Paperback – 2010,Dhanpat Rai Publications (Reprint 2015)
4. Robert Horonjeff, Francis X. McKelvey, Willian J Sproule, Seth B. Young (2010), Planning &Design of Airports, McGraw-Hill Professional.
5. Transportaion Engineering by R. Srinivasa Kumar, University Press India

21CE822PE: URBAN TRANSPORTATION PLANNING (PE – VI)

B.Tech. IV Year I Sem.	L	T/P/D	C
	3	0/0/0	3

Pre-requisites: Transportation Engineering

UNIT I:

Transport Planning Process: Scope – interdependence of land use and traffic – systems approach to transport planning – Transport surveys – definition of study area – zoning survey - types and methods
– inventory on transport facilities - inventory of land use and economic activities.

UNIT II:

Trip Generation: Factors governing trip generation and attraction rates – multiple linear regression analysis – category analysis – critical appraisal of techniques.

UNIT III:

Trip Distribution Methods: Presentation of trip distribution data - PA matrix to OD matrix – Growth factor methods - gravity model and its calibration – opportunity model

UNIT IV:

Modal split analysis: Influencing factors – Earlier modal split models: Trip end type and trip interchange type – limitations – Disaggregate mode choice model – Logit model - binary choice situations – multinomial logit model – model calibration

UNIT V:

Route assignment: Description of highway network – route choice behaviour – shortest path algorithm
- assignment techniques – all nothing assignment – multi path assignment – capacity restrained assignment – diversion curves

TEXT BOOKS:

1. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning, Khanna Publishers, NewDelhi.
2. Hutchinson, B.G. (1974). Principles of Urban Transport Systems Planning. McGraw Hill BookCompany, New York.

REFERENCE BOOKS:

1. Papacostas, C. S., and Prevedouros, P.D. (2002). Transportation Engineering and Planning.3rd Edition, Prentice - Hall of India Pvt Ltd.
2. NPTEL videos on Urban Transportation Planning, Dr. V. Tamizh Arasan, IIT Madras
3. Paul.H. Wright (1995), Transportation Engineering – Planning & Design, John Wiley & Sons,New york.
4. John W Dickey (1995), Metropolitan Transportation Planning, Tata McGraw-Hill publishingcompany Ltd, New Delhi.

21CE823PE: FINITE ELEMENT METHODS FOR CIVIL ENGINEERING (PE – VI)

B.Tech. IV Year I Sem.	**L**	**T/P/D**	**C**
	3	**0/0/0**	**3**

Pre-Requisites: SA – I & SA – II

Course Objectives: The subject provides introduction to finite element methods to analyse structural elements

Course Outcomes: At the end of the course the student will able to Anslyse simple structrual elementsusing Finite Element approach

UNIT – I

Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain equation – concept of plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom Displacement function – Natural Coordinates – strain displacement relations.

UNIT – II

Lagrangian – Serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element – shape functions upto quadratic formulation.

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffnessmatrix – stress – strain relation

UNIT – III

FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

UNIT – IV

FEA Two-dimensional problem – CST – LST element – shape function – stress – strain. Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis - formulation of CST element.

UNIT-V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS:

1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning IndiaPvt. Ltd.
2. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D.Belegundu, Prentice Hall of India

REFERENCE BOOKS:

1. Finite Element Aanalysis by P. Seshu, PHI Learning Private Limited
2. Concepts and applications of Finite Element Analysis by Robert D. Cook *et al.*, Wiley India Pvt.Ltd.
3. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishing House Pvt. Ltd.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - III

21MBA16: PRODUCTION AND OPERATIONS MANAGEMENT

Course Objective: To understand the concepts of production and operations management in an organization and analytical methods.

Learning Outcome: Students will be able to understand a) Concepts of Operations management, b) Product & process design, analysis, c) Plant location and layout, d) Scheduling and Material Management.

*****

Unit - I: Introduction to Operations Management: Functional Subsystems of Organization, Definition, Systems Concept of Production, Types of Production Systems – Flow, Job Shop, Batch Manufacturing and Project, Strategic Operations Management – Corporate Strategic, Generic competitive Strategies, Functional Strategies, Productivity, World Class Manufacturing.

Unit - II: Product Design and Analysis: New product development -its concepts, Steps of Product Design, Process Planning and Design- Selection of Process, Responsibilities of Process Planning Engineer, Steps in Process Planning. Process Design - Process Research, Pilot Plant Development, Capacity Planning, Enhanced Capacity using Optimization. Value Analysis/Value Engineering –Value Analysis application, Value Engineering Procedure, Advantages and Application Areas. Ergonomic considerations in Product Design. Standardization: Standardization Procedure, Advantages of Standardization, Application of Standardization.

UNIT - III: Plant Location and Plant Layout: Factors Influencing Plant Location, Break-even Analysis. Single Facility Location Problem, Multi facility Location Problems – Model for Multi facility Location Problem, Model to Determine X- Coordinates of New Facilities, Model to Determine Y- Coordinate,

Plant Layout - Plant layout introduction, classification of Layout, Advantages and limitations of Product Layout, Advantages and limitations of Group Technology Layout, Layout Design Procedures.

Unit - IV: Scheduling: Introduction, Johnson's Algorithm, Extension of Johnson's rule. Job Shop Scheduling: Introduction, Types of Schedules, Schedule Generation, heuristic Procedures, Priority Dispatching Rules. Two Jobs and m Machines Scheduling. Quality control concepts

Unit - V: Materials Management: Integrated Materials Management, Components of Integrated Materials Management- Materials Planning, Inventory Control, Purchase Management, Stores Management, EOQ, Models of Inventory, Operation of Inventory Systems, Quantity Discount, Implementation of Purchase Inventory Model– Incoming Materials Control, Obsolete Surplus and Scrap Management, ABC Analysis, XYZ Analysis, VED Analysis, FSN Analysis, SDE Analysis.

Suggested Readings:

- Panneerselvam, Production and Operations Management, PHI, 2012.
- K. Ashwathappa, Sridhar Bhatt, Production and Operations

Management, HimalayaPublishing House, 2012
- S N Chary, Productions and Operations Management, Mc Graw Hill, 2019.
- Jay Heizer, Barry Render, Operations Management, 11e, 2016.
- K. Boyer, Rohit Verma, Operations Management: Cengage Learning, 2011
- Ajay K. Garg, Production and Operations Management, TMH, 2012.
- B. Mahadevan, Operations Management: Theory and Practice, Second Edition, Pearson,2010.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - III

21MBA17: MANAGEMENT INFORMATION SYSTEM

Course Objective: To understand the importance of information systems in organization for decision making.

Learning Outcome: Students will be able to understand a) Concepts & applications of Management Information Systems b) Information Systems Planning & Implementations c) Cyber crime and information security.

*****

Unit - I: Introduction: Information systems in Business, Types of information systems, Managerial challenges of IT, components of information system resources and activities. System for collaboration and social business, ethical and social issues in Information system, Information system for strategic advantages.

Unit - II: Business Applications of Information Systems: e - business systems, functional business systems, Customer Relationship Management, ERP Systems, Supply Chain, e-commerce, DSS, Business analytics, Business Intelligence and Knowledge Management System.

Unit - III: Management of Information Systems: Information system planning, system acquisition, systems implementation, system development models: Water fall model, system development life cycle, v-model, computer- assisted and software engineering tools, prototype iterative model, evaluation & maintenance.

Unit - IV: Management of Information Systems: System Development and organizational change, Business process redesign, Systems Analysis, system Design- System development process, methodology for modeling and designing system, alternative methods for building information system, new approaches for system building in the digital firm era.

Unit - V: Introduction to Cyber Crime: Cyber space; cyber law; e-business; e - consumers; spam; phishing. Cyber crime and information security, cyber criminals, inter networks security defenses, other security measures, system control and audit, Block chain.

Suggested Readings:

- Management Information Systems Managing the Digital Firm, Laudon & Laudon, Pearson, 15e 2017.
- Management Information Systems, Ramesh Behl, James A.O' Brien, George M. Marcus, McGraw Hill, 11e, 2019
- Management Information Systems–Managerial Perspective, D P Goyal, MacMillan, 3eEdition, 2010.
- Management Information Systems, Sahil Raj, Pearson, 2e,2018
- Management Information Systems Text and Cases, Jawadekar, Tata Mc Graw Hill, 2012.
- Management Information Systems, Kelkar, Prentice Hall India, 2012.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - III

21MBA18: DATA ANALYTICS

Course Objective: To understand the importance of ever-increasing volume, variety and velocity of data in organization and application of data analytical tools for decision making.

Learning Outcome: Students will be able to understand a) Importance of Analytics b) Understanding the analytical tools c) Application of Analytical tools to solve business problems.

*****

UNIT - I: Introduction to Data Analytics: Introduction to Data- Importance of Analytics- Data for Business Analytics –Big Data - Business Analytics in Practice. Data Visualization – Data Visualization tools, Data queries, Statistical methods for Summarizing data, Exploring data using pivot tables.

Unit - II: Descriptive Statistical Measures – Population and samples, Measures of location, Measures of Dispersion, Measures of variability, measures of Association. Probability distribution and Data Modeling – Discrete Probability distribution, Continuous Probability distribution, Random sampling from Probability Distribution, Data Modeling and Distribution fitting.

Unit - III: Predictive Analytics: Karl Pearson Correlation Techniques - Multiple Correlation- Spearman's Rank correlation -Simple and Multiple regression - Regression by the method of least squares – Building good regression models – Regression with categorical independent variables - - Linear Discriminant Analysis - One way and Two-Way ANOVA

Unit - IV: Data Mining: Scope of Data Mining, Data Exploration and Reduction, Unsupervised learning – cluster analysis, Association rules, Supervised learning- Partition Data, Classification Accuracy, prediction Accuracy, k-nearest neighbors, Classification and regression trees, Logistics Regression.

Unit - V: Simulation: Random Number Generation, Monte Carlo Simulation, What if Analysis, Verification and Validation, Advantages and Disadvantages of Simulation, Risk Analysis, Decision Tree Analysis.

Suggested Readings:

- James Evans, Business Analytics, 2e, Pearson, 2017.
- Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams Essential of BusinessAnalytics, Cengage Learning.
- Thomas Eri, Wajid Khattack& Paul Buhler: Big Data Fundamentals, Concepts, drivers andTechniques by Prentice Hall of India, New Delhi, 2015
- Wilfgang Jank, Buisness Analytics for Managers, Springer, 1e, 2014.
- Akil Maheswari, Big Data, Upskill ahead by Tata McGraw Hill, New Delhi, 2016
- Foster Provost and Tom Fawcett, Data Science for Business, Shroff Publisher, 2018.
- Seema Acharya & Subhashini Chellappan: Big Data and Analytics, Wiley

Publications, NewDelhi, 2015.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - IV

21MBA23: STRATEGIC MANAGEMENT

Course Objective: To provide a Strategic orientation in conduct of the business.

Learning Outcome: Students will be able to understand a) Strategic management concepts b) Tools and Techniques for Strategic analysis c) Strategies for competing in globalised markets d) Strategy Evaluation and Control.

*****

Unit – I: Introduction - Concepts in Strategic Management, Strategic Management Process, developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy, Environmental Scanning: Industry and Competitive Analysis – Methods. Evaluating company resources and competitive capabilities – SWOT Analysis – Value Chain Analysis and Competitive advantage.

Unit – II: Tools and Techniques for Strategic Analysis - Porter's Five Force Model, BCG Matrix, GE Model, TOWS Matrix, IE Matrix, The Grand Strategy Matrix. Market Life Cycle Model - and Organizational Learning, Impact Matrix and the Experience Curve, Generic Strategies- Strategy Formulation - Types of Strategies – offensive strategy, defensive strategy, Exit and entry barriers - Tailoring strategy to fit specific industry and company situations.

Unit – III: Strategy Implementation: Strategy and Structure, Strategy and Leadership, Strategy and culture connection - Operationalizing and institutionalizing strategy - Strategies for competing in Global markets and internet economy - Organizational Values and their impact on Strategy – Resource Allocation as a vital part of strategy – Planning systems for implementation.

Unit – IV: Turnaround and Diversification Strategies: Turnaround strategy - Management of Strategic Change, strategies for Mergers, Acquisitions, Takeovers and Joint Ventures, Alliances and cooperative - Diversification Strategy: firms diversify, different types of diversification strategies, the concept of core competence, strategies and competitive advantage in diversified companies and its evaluation. International Strategies.

Unit – V: Strategy Evaluation and control – Establishing strategic controls for Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance – Guidelines for proper control- Strategic surveillance -strategic audit - Strategy and Corporate Evaluation and feedback in the Indian and international context

Suggested Readings*:*

- Hitt & Ireland el al., Strategic Management: A South Asian Perspective, Cengage Learning,9e, 2013.
- Gregory Dess and G.T. Lumpkin: Strategic Management – Creating Competitive Advantage,TMH, 2009.
- Mason A.Carpenter, Wm Gerard Sanders, Prashant Salwan: Strategic Management ADynamic Perspective, Pearson, 2e, 2017

- V.S.P. Rao, V. Hari Krishna; Strategic Management, 1e, Excel Books, 2012
- Adrian & Alison, Strategic Management: Theory & Applications, Oxford University Press,2010.
- S K Sarangi, Modern Strategic Management, Everest Publishing, 2012.
- Thompson & Strickland: Strategic Management, Concepts and Cases. TMH, 2009.

Syllabus of Elective Subjects

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA19M1: DIGITAL MARKETING

Course Objective: The objective of this course is to understand the importance of digital marketing and its applications.

Learning Outcome: Students will be understanding a) the applications of digital marketing in the globalized market b) Channels of Digital Marketing c) digital marketing plan d) Search engine marketing e) Online Advertising

*****

Unit - I: Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

Unit - II: Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels.

Unit - II: Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organisational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

Unit - III: Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

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Unit - IV: Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

Unit - V: Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention.

Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Suggested Readings:

- Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
- Vandana Ahuja, Digital marketing, Oxford University Press 2015
- Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015.

- Judy Strauss & Raymond Frost, E-Marketing, Pearson, 2016
- Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approachOxford University Press 2007.
- Chuck Hemann& Ken Burbary, Digital Marketing Analytics, Pearson, 2019

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA20M2: ADVERTISING AND SALES MANAGEMENT

Course Objective: To understand Advertising, Sales Management and Sales Personnel, the role of Distribution Channels and enabling them to manage Channel Institutions.

Learning outcome: Student will be able to understand the importance of Sales Management, Sales Planning and Budgeting and need for distribution channels and managing them.

*****

Unit – I: Advertising: Concept, Evolution, Promotion Mix, Importance and Functions of Advertising, Role of Advertising, AIDA model, Types of Advertising, Advertising Plan, DAGMAR Approach, Visualization of Advertising Layout – Functions, Principles, Elements of a layout.

Unit – II: Advertising Media: Types of Media – Print, Electronic, Other Media – Merits and Demerits of each media, Media Planning – frequency, reach and outcome, Appeals, Setting Advertising Objectives, Advertising Message, Advertising Budget, Evaluation of Advertising Effectiveness – Methods, and Regulation of Advertising in India – Misleading and deceptive advertising.

Unit – III: **Sales Management**: Importance, types of Selling, difference between Selling and Marketing, Sales Activities, Selling Skills, Selling Strategies, Selling Process, Sales Planning Process, Sales Forecasting Methods, Sales Budgeting Process. Sales Force Management - Recruitment and selection, training, sales force motivation, compensation, sales force control and evaluation.

Unit – IV: Sales Promotion: Concepts, need, objectives, Personal Selling vs. Advertising, Types of Sales Promotion, Sales Promotion Strategies - Sales Promotion and Product Life Cycle, Cross Promotion, Surrogate Selling, Bait and Switch advertising, Ethical and legal aspects of sales promotion.

Unit – V: Sales Distribution: Distribution Channels, Need for Channels, Channel Intermediaries and Functions, Channel Structure, Channel for consumer products, business and industrial products, alternative channel, Channels for Rural Markets, channel Strategy Decisions. Designing, Motivating and Evaluating Channel Members, Managing Retailers, Wholesalers, Franchisers, Managing Conflict - reasons for Channel Conflicts, Managing International Channel of Distribution, Ethical issues in Sales and Distribution Management

Suggested Readings:

- Terence A. Shimp, J. Craig Andrews, Advertising, Promotion, and other aspects of IntegratedMarketing Communications, 9e, Cengage, 2016
- Jaishri Jethwaney, Shruti Jain, Advertising Management, Oxford, 2015
- Richard R Still, Edward W Cundiff, Norman A P Govoni, Sales and Distribution Management,5e, Pearson, 2011
- Ramendra Singh, Sales and Distribution Management: A Practice-Based

Approach, 1e,Vikas, 2016

- K. Sridhara Bhat, Sales and Distribution Management, 1e, HPH, 2011.
- S.A. Chunawalla, Sales and Distribution Management, 3e, HPH. 2012
- George E.Belch, Michel E.Belch, Keyoor Purani, Advertising and Promotion: An integratedmarketing communication Perspective, Mc Graw Hill, 9e, 2017.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA21M3: CONSUMER BEHAVIOR

Course Objective: To understand marketing decisions keeping in mind the consumer behaviour. **Learning outcome:** Student should be able to a) understand consumer behaviour b) environmentalinfluences on consumer behaviour, c) perception and attitude of consumers, d) consumer decisionmaking e) marketing ethics towards consumers.

*****

Unit - I: Understanding Consumer Behaviour: Defining consumer behaviour, need for Consumer Behaviour, Understanding Consumer through research process, Consumer behaviour in a world of economic instability, Rural Consumer Behaviour, Consumer Segmentation, Targeting and Positioning, Segmentation & Branding, Rural Markets.

Unit - II: Environmental Influences on Consumer behaviour: Influence of Culture, Sub Culture, Social Class, Social Group, Family and Personality, Cross-Cultural Consumer Behaviour.

Unit - III: Consumer as an Individual: Personality and Self-concept, Consumer Motivation, Consumer Perception, Consumer Attitudes and Changing Attitudes, Consumer Learning and Information Processing.

Unit - IV: Consumer Decision Making Processes: Problem Recognition, Search and Evaluation, Purchasing processes, Post purchase behaviour, Models of Consumer decision making, Consumers and the diffusion of Innovations.

Unit - V: Consumerism and Ethics: Roots of Consumerism, Consumer Safety, Consumer Information, Consumer Responsibilities, Marketer responses to consumer issues, Marketing Ethics towards Consumers.

Suggested Readings:

- David l. Loudon and Albert J.Della Bitta, 4e, Mc Graw Hill, 2011.
- Leon G. Schiffman, Leslie lazer Kanuk, S. Ramesh Kumar, 10e, Pearson, 2011.
- Satish Batra, SHH kazmi, Consumer Behaviour-Text and Cases, 2e, Excel Books, 2011.
- Kardes, Cline, Cronley, Consumer Behaviour-Science and Practice, Cengage Learning, 2012.
- S. Ramesh kumar, Consumer Behaviour and Branding, Pearson, 2013.
- Dheeraj Sharma, Jagadish Deth, Banwari Mittal, Consumer Behaviour – A managerialPerspective, Cengage Learning, 2015.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA24M4: CUSTOMER RELATIONSHIP MANAGEMENT

Course Objective: To understand the importance of Customer Relationship Management in Business.

Learning Outcome: Students will be able to understand a) need of CRM b) building customer relations c) CRM process d) CRM structures e) Planning and Implementation of CRM.

*****

Unit - I – Introduction to CRM: Concepts, Evolution, Need, understanding goals and objectives of CRM, Components of CRM, Benefits, CRM as a strategic marketing tool, CRM significance to the stakeholders, CRM Applications in Consumer and Business Markets, CRM Issues & Problems

Unit - II – Building Customer Relations: Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behaviour in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments - Customer Life Cycle, Business Networks and CRM.

Unit - III - CRM Process: Introduction and Objectives of a CRM Process; an Insight into CRM and e- CRTA/online CRM, The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase; Modules in CRM, 4C's (Elements) of CRM Process, CRM Process for Marketing Organization, CRM Value Chain, CRM Affiliation in Retailing Sector.

Unit - IV - CRM Structures: Elements of CRM – CRM Process – Strategies for Customer acquisition

– Customer Retention and Development – Strategies for Customer Retention, Models of CRM – G- SPOT Model, KOEL's Model, WebQual Audit Model, ONYX Model - CRM road map for business applications.

Unit - V - CRM Planning and Implementation: Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM –Operational CRM – Call centre management – Role of CRM Managers, Trends in CRM- e-CRM Solutions – Features and advantages of e CRM, Functional Components of e CRM- Data Warehousing – Data mining for CRM – an introduction to CRM softwarepackages.

Suggested Readings:

- G. Shainesh, Jagdish, N.Sheth, Atul Parvatiyar, Customer Relationship Management:Emerging Concepts, Tools and Applications, Macmillan 2005.
- Francis Buttle, Customer Relation Management: Concepts and Technologies, 2e, Routledge,2013.
- Ekta Rastogi, Customer Relation Management: Text and Cases, Excel Books, 2011.
- Zikmund, Customer Relationship Management, Wiley 2012.

- Paul Greenberg, CRM at the speed of light, 4e, TMH, 2009.
- Lakshman Jha, Customer Relationship Management: A Strategic Approach, Global India PvtLtd, 2008.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA25M5: INTERNATIONAL MARKETING

Course Objective: To understand the Global Markets, formulation of Global Marketing Strategies and its Implementation.

Learning Outcome: Students will be to get deeper insight into a) the Global Marketing Management, b) Environment of global markets, c) Assessing Global Market Opportunities, d) Developing and Implementing Global Marketing Strategies.

*****

Unit – I: Introduction to International Marketing: Environment and Sustainability, Scope, Importance of World Trade, Features, Opportunities and Challenges in International Marketing, Comparison of Domestic with International Marketing, Stages of International Marketing, Motivating Factors of International Marketing, Internationalisation – Reasons and Strategies.

Unit – II: Global Environmental Drivers: WTO and Globalization – Issues, Types - Political, Economic, Social, Legal and Technological Environments, EXIM Policy, International Trade and its barriers, trade in Goods & Services, International Trade Agreements.

Unit – III: Global Customers: Drivers of Global Consumers, Influences of the Global Consumer - Role of Culture - elements, Social Factors, Situational Factors, Industrial Buyer, Government Buyer, International Marketing Research: Opportunity Analysis, Market Selection, Assessing Market Size and Sales Potential, Government Policies of Target Markets, SWOT Analysis of Target Markets, Global Market Entry Modes – Strategies, Problems and Challenges.

Unit – IV: Global Marketing: Globalization Drivers – Market, Cost, Environmental, Competitive Factors, International Marketing Mix, Developing the Global Marketing Program, Segmentation of product &services, Marketing channels and Distribution Promotion Strategies, Pricing strategies – Factors influencing Pricing Decisions, Concept of International Product Life Cycle.

Unit – V: Implementing Global marketing strategies: Negotiation with customers and selection method – Cultural and International Negotiations, E-Marketing channels organization &controlling of the global marketing programme, Export Documentation, Export Procedures, Steps in processing an Export Order.

Suggested Readings:

- Michael R. Czinkota, Ilkka A. Ronkainen, International Marketing, 10e, Cengage, 2017
- Justin Paul, Ramneek Kapoor, International Marketing: Text and Cases, 2e, TMH, 2012
- Philip R. Cateora John L Graham Prashant Salwan, International Marketing -13th edition,TMH,2011
- Svend Hollensen, Madhumita Benerjee-Global Marketing-4th Edition-Pearson,2010

- Rajagopal –International Marketing-2nd Edition –Vikas ,2011
- P.K. Vasudeva, international Marketing-4th edition-Excel Books,2012
- Kiefer Lee, Steve Carter-Global Marketing Management-3rd edition-Oxford,2011

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA MARKETING ELECTIVE

21MBA26M6: SERVICES MARKETING

Course Objective: To facilitate the students about the concepts of Services Marketing through cases.

Learning Outcome: Students will be to understand a) Marketing Management of companies offering Services b) Characteristics of services, c) to understand consumer behaviour in services, d) align service design and standards, e) delivering service, managing services promises.

*****

Unit - I: Introduction to Services Marketing: Services – Concepts, Characteristics, Classification of Services, Goods vs. Services, Services Marketing Mix, Service Marketing Triangle, Factors responsible for Growth of Services sector, Challenges faced by the Services Sector, Service and Technology, Impact of Technology on Service Firms, Emerging Service Sectors in India.

Unit - II: Focusing on Consumer: Consumer Behaviour in services, Relevance of Consumer Behaviour, Consumer Expectations in service, Consumer Perceptions of service, Customer Satisfaction, Understanding Consumer Requirements-listening to customers through research, building customer relationships, Customer Feedback, Service Failure and Service Recovery – Recovery Strategies.

Unit - III: Innovation and Quality: Service Innovation – Design, Challenges, Mapping Patterns of Service Innovation, Types of Service Innovation, stages in service innovation and development, Service Quality, Gaps model of Service Quality-Customer Gap, Provider Gap and Closing Gap, Service Excellence, Service Standards- factors, types, Physical Evidence – managing Physical Evidence, and the Servicescape – Designing Servicescapes.

Unit - IV: Managing Service Operations: Service Process, Service Blueprinting, Managing Demand and Supply, Participants in Services - Employee's roles in Service Delivery, Customer's roles in Service Delivery, Mass Production and Delivery, Service Guarantee, Ethics in Service Firms.

Unit - V: Managing Service Promises: Managing Distribution Channels in Service Industry – Strategies for Distribution, Managing People in Service Industry – Challenges, Pricing Strategies for Services – Methods, Promotion Strategies for Services - Need for Coordination in Marketing Communication, five categories of strategies to match service promises with delivery.

Suggested Readings:

- John E.G. Bateson, K.Douglas Hoffman: Services Marketing, Cengage Learning, 4e, 2015.
- Vinnie Jauhari, Kirti Dutta: Services Marketing: Operations and Management, OxfordUniversity Press, 2014.
- Christoper Lovelock, Jochen wirtz, Jayanta Chatterjee, Services Marketing, 7th editionPearson 2015

- Valarie A. Zeithaml & Mary Jo-Bitner: Services Marketing – Integrating customer focus acrossthe firm, TMH, 6e, 2013.
- Nimit Chowdhary, Monika Chowdhary, Textbook of Marketing of Services: The IndianExperience, MACMILLAN, 2013.
- Govind Apte: Services Marketing, Oxford Press, 2011.
- K. Rama Mohana Rao, Services Marketing, Pearson, 2e, 2011.

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MBA FINANCE ELECTIVE

21MBA19F1: SECURITY ANALYSIS PORTFOLIO MANAGEMENT

Course Objective: To understand the investment process, investment alternatives, Valuation of debtand equity.

Learning Outcome: Students will be able to understand a) Indian Investment Environment b) Portfolio Analysis c) Bond valuation and management d) Equity valuation of Cash market andderivatives e) Performance evaluation of Portfolios.

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Unit - I: Introduction to Investment - Investment, Speculation and Gambling, Features of Investment, Investment Avenues, Investment Process. The Investment Environment – Securities Market of India, – Securities Trading and Settlement – Types of Orders - Margin Trading.

Unit - II: Portfolio Analysis: Risk and return Analysis - Markowitz Portfolio Theory, Mean- variance approach, portfolio selection - efficient portfolios, Single Index model - Capital Asset pricing model, Arbitrage Pricing Theory.

Unit - III: Bond Valuation: Classification of Fixed income securities, Types of bonds, Interest rates, Term Structure of interest rates, measuring bond yields, Yield to Maturity, Yield to Call, Yield to Maturity, Holding Period Return, Bond pricing theorems, bond duration, Active and Passive bond management Strategies, bond immunization, bond volatility, bond convexity.

Unit - IV: Equity Valuation: a) Equity Analysis & Valuation, Equity Valuation Models, Relative Valuation techniques – Earnings Multiplier Approach, Valuation using P/E ratio, Price to Book Value, Price/sales ratio, Economic value added approach.

b) Fundamental Analysis, Technical Analysis, Efficient Market Hypothesis.

Unit - V: a) Derivatives: Overview of Indian derivatives Markets, Option Markets, Option Strategies and Option Valuation, Forward & Future markets, Mechanics of Trading, Strategies.

b) Performance Evaluation: Mutual Funds, Types of Mutual Funds Schemes, Structure, Trends in Indian Mutual Funds, Net Asset Value, Risk and Return, Performance Evaluation Models- Sharpe Model, Treynor Model, Jensen Model, Fama's Decomposition.

Suggested Readings:

- William. F. Sharpe, Gordon J Alexander & Jeffery V Bailey: Fundamentals of Investments,Prentice Hall, 2012.
- ZVI Bodie, Alex Kane, Alan J Marcus, Pitabas Mohanty Investments, Mc Graw Hill, 11 e,2019
- Donald E Fischer, Ronald J Jordan: Security Analysis and Portfolio Management, 6th Edition,Pearson.
- Charles P. Jones, Investments Analysis and Management, 9e, Wiley, 2004.
- Shalini Talwar, Security Analysis and Portfolio Management, Cengage Learning, 2016.

- Prasanna Chandra: Investment analysis and Portfolio Management" 4th Edition, TMH, 2013.
- Punithavathy Pandian, Security Analysis &Portfolio Management, Vikas, 2014

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MBA SEMESTER-III FINANCE ELECTIVE

21MBA20F2: FINANCIAL INSTITUTIONS, MARKETS AND SERVICES

Course Objectives: To give an understanding about Indian Financial system with respect to Markets,Institutions and Services.

Learning Outcome: Students will be able to understand a) Introduction to Indian Financial system b) Banking and Non-Banking Institutions c) Financial and Securities markets d) Fund and Fee based services**.**

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Unit – I: Introduction: The structure of Indian financial system; Equilibrium in financial markets; Indicators of Financial Development, Structure of Financial Institutions, Financial system and economic development; Financial Sector reforms after 1991 –Recent Developments of Indian Financial System.

Regulatory and Promotional Institutions: Function and Role of RBI, Monetary Policy and techniques of monetary control of RBI, Major Changes in Monetary Policy. The role and functions of SEBI. An update on the performance on Non-statutory Financial organization like IFCI, IRBI, IDFC, NABARD, SIDBI, and SFCs.

Unit - II: Banking and Non-Banking Institutions: Commercial banks – Growth and structure of commercial Banks- competition, interest rates, spreads, and NPAs. Bank capital – adequacy norms and capital market support. Banking Innovations- e-banking- Risk Management in Banking. Co- operative banks- Features, Structure and Growth, Government initiatives to strengthen the co- operative banks.

Non-banking financial Institutions: Structure and functioning of Unit Trust of India and Mutual Funds. Growth of Indian Mutual funds and its Regulation. The Role of AMFI. Insurance Companies – Structure and Investment Pattern of Public and Private Sector insurance companies, Competition, innovation, Role of IRDA, Challenges of Insurance Sector in India.

Unit - III: Financial and Securities Markets: Structure and functions of Call Money Market, Government Securities Market – T-bills market, Commercial Bills market, Commercial paper and certificate of deposits- Securities markets – Organization and structure, Listing trading and settlement. SEBI and Regulation of Primary and Secondary Markets. Role and functions of Clearing Corporation of India Ltd

Unit - IV: Asset /Fund Based Financial Services – Lease Finance- Conceptual and Regulatory Framework, Classification and Financial leasing, Hire Purchase and Consumer Credit, Factoring and Forfeiting, Housing finance, Venture capital financing.

Unit - V: Fee-based / Advisory services: Investment Banking – Introduction, Functions and activities of Merchant bankers, Lead Managers, underwriting, bankers to an issue, debenture trustees, portfolio managers. Challenges faced by investment bankers. Stock broking, Custodial Services, Depository system, Credit rating – Role of agencies, Process, regulations. CIBIL

Suggested Readings:

- L.M. Bhole: Financial Institutions and Markets, TMH, 2012.
- M.Y. Khan: Financial Services, TMH, 2012.
- S. Gurusamy: Financial Services and System, Cengage,2012
- Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services,Pearson, 2012.
- Frank. J. Fabozzi & Franco Modigliani: Foundations of Financial Markets and Institutions,Pearson, 2012.

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MBA FINANCE ELECTIVE

21MBA21F3: STRATEGIC MANAGEMENT ACCOUNTING

Course Objective: To understand the components of product cost, their calculation methods, and their control.

Learning Outcomes: Students will be able to understand a) Fundamentals of Management accounting and Cost accounting b) Cost analysis c) Marginal costing d) Budget and Budgetary controls.

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Unit - I: Introduction to Management Accounting, Cost analysis and Control: Management accounting Vs. Cost accounting vs. financial accounting, Role of accounting information in planning and control, Cost concepts and Managerial use of classification of costs. Cost analysis and control: Direct and Indirect expenses, allocation and apportionment of overheads, calculation of machine hour rate. Activity based costing.

UNIT- II: Costing for Specific Industries: Unit costing, Job Costing, Cost Sheet and tender and process costing and their variants, treatment of normal losses and abnormal losses, inter-process profits, costing for by-products and equivalent production.

UNIT - III: Marginal Costing I: Introduction, Application of Marginal costing in terms of cost control, profit planning, closing down a plant, dropping a product line, charging general and specific fixed costs, fixation of selling price. Make or buy decisions, key or limiting factor.

Marginal Costing - II: Selection of suitable product mix, desired level of profits, diversification of products, closing down or suspending activities, level of activity planning. Break-even analysis: application of BEP for various business problems. Inter-firm comparison: need for inter-firm comparison, types of comparisons, advantages.

UNIT - IV: Budgetary Control: Budget, budgetary control, steps in budgetary control, Flexible budget, different types of budgets: sales budget, Cash budget, Production budget, Performance budgets, Zero Based Budgeting; An introduction to cost audit and management audit.

UNIT - V: Standard Costing**:** Standard Cost and Standard Costing, Standard costing Vs Budgetary control, Standard costing Vs estimated cost, Standard costing and Marginal costing, analysis of variance, Material variance, Labor variance and Sales variance.

Suggested Readings:

- Hansen Mowen, Cost and Management Accounting& Control, Thompson Publications 2012
- S.P. Jain and K.L. Narang, Cost and Management Accounting, Kalyani Publishers, NewDelhi, 2006.
- M.Y. Khan, P.K. Jain, Management Accounting: Theory and Problems, TMH, New Delhi, 4/e,2007.

- James Jiambalvo, Managerial Accounting, John Wiley & Sons, Inc.New Delhi,2007.
- Atkinson, Banker, Kaplan and Young, Management Accounting, PHI, 2006.
- Manash Gupta, Cost Accounting Principles and Practice, Pearson Education,2006

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MBA FINANCE ELECTIVE

21MBA24F4: INTERNATIONAL FINANCIAL MANAGEMENT

Course Objective: To give an understanding about MNC Financial Management, Balance of Payments and Forex markets.

Learning Outcomes: Students will be able to understand a) International Financial Management b) Balance of Payments c) Foreign Exchange Markets d) Asset and liability Management.

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Unit - I: Introduction: An overview, Importance, nature and scope of International Financial Management, Domestic FM Vs. IFM, International Business Methods, Recent changes and challenges in International Financial Management.

Unit - II: International Flow of Funds: Balance of Payments (BOP), Fundamentals of BOP, Accounting components of BOP, Factors affecting International Trade flows, Agencies that facilitate International flows. Indian BOP Trends.

International Monetary System: Evolution, Gold Standard, Bretton Woods's system, the flexible exchange rate regime, evaluation of floating rates, the current exchange rate arrangements, the Economic and Monetary Union (EMU).

Unit - III: Foreign Exchange Market: Function and Structure of the Forex markets, major participants, types of transactions and settlements dates, Foreign exchange quotations. Process of arbitrage, speculation in the forward market. Currency Futures and Options Markets, Overview of the other markets – Euro currency market, Euro credit market, Euro bond market, International Stock market.

Unit - IV: (a) Exchange Rates: Measuring exchange rate movements, Factors influencing exchange rates. Government influence on exchange rates – exchange rate systems. Managing Foreign exchange Risk. International arbitrage and interest rate parity.

(b) Relationship between inflation, interest rates and exchange rates – Purchasing Power Parity – International Fisher Effect – Fisher Effect- Interest Rate parity, Expectations theory

Unit - V: Asset–liability Management: Foreign Direct Investment, International Capital Budgeting, International Capital structure and cost of capital. International Portfolio Management.

International Financing: Equity, Bond financing, parallel loans - International Cash management, accounts receivable management, inventory management. Payment methods of international trade, trade finance methods, Export – Import bank of India, recent amendments in EXIM policy, regulations and guidelines.

Suggested Readings:

- Jeff Madura, International Corporate Management, Cengage, 2012.
- Alan C. Shapiro, Multinational Financial Management, John Wiley, 2012

- S. Eun Choel and Risnick Bruce: International Financial Management, TMH, 2012
- Sharan.V, International Financial Management 5e, PHI, 2012
- P.G. Apte, International Financial Management, TMH 2012.
- Madhu Vij: International Financial Management, Excel, 2012.

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MBA FINANCE ELECTIVE

21MBA25F5: STRATEGIC INVESTMENT AND FINANCING DECISIONS

Course Objective: To develop an understanding of the role of financial strategy, in the investing, financing and resource allocation decisions within an organization.

Learning Outcomes: Students will be able to understand a) Investment Decisions in Risk and uncertainty b) Strategic investment decisions c) Investment Appraisal Techniques d) Financing Decisions

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Unit - I: Investment decisions under conditions of Risk and uncertainty: Concepts of risk and uncertainty. Risk Analysis in Investment Decisions. Risk adjusted rate of return, certainty equivalents, Probability distribution of cash flows, decision trees, sensitivity analysis and Monte Carlo Approach to Simulation. Investment Decisions under capital constraints: Capital Rationing vs. Portfolio. Portfolio Risk and diversified projects.

Unit - II: Types of Investments and disinvestments: Project abandonment decisions, Evidence of IRR. Multiple IRR, Modified IRR, Pure, simple and mixed investments. Lorie Savage Paradox. Adjusted NPV and impact of inflation on capital budgeting decisions.

Unit - III: Critical analysis of appraisal techniques: Discounted pay back, post pay back, surplus life and surplus pay back, Bail-out pay back, Return on Investment, Equivalent Annual Cost, Terminal Value, single period constraints, multi-period capital constraint and an unresolved problem, NPV mean variance analysis, Hertz Simulation and Hillier approaches. Significance of information and databank in project selections.

Unit - IV: Strategic Analysis of selected investment decisions: Lease Financing, Operating Risk, borrowing vs. procuring. Hire purchase and Installment decisions. Lease Risk Management, Leasing as a Financing Decision, Advantages of Leasing, and Leasing Decision in practice.

Unit - V: Financing Decisions: Mergers and Acquisitions - need, Strategy, Diversification and Mergers and Acquisitions, Theories of Mergers, Types of Mergers, Cost of Mergers, Government guidelines for Takeover, Problems on Mergers & Acquisitions and cases

Suggested Readings:

- Ravi M Kishore "Strategic Financial Management, Taxman 2012.
- Prasanna Chandra: Financial Management, 8/e, TMH, 2012
- Prasanna Chandra: Projects: Planning, Analysis, Financing Implementation and Review, 6/e,TMH, 2012
- I.M. Pandey: Financial Management, Vikas 2012.
- Brigham & Ehrhardt: Financial Management, Text and Cases, Cengage, 2012.
- MY Khan and PK Jain: Financial Management: Text, Problems & Cases, TMH, 2012.

- A.N. Sridhar, Strategic Financial Management, Shroff Publishers, 3e, 2018.

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MBA FINANCE ELECTIVE

21MBA26F6: RISK MANAGEMENT & FINANCIAL DERIVATIVES

Course Objective: To understand the concepts of Risk Management, measurements and risk management strategies using derivatives.

Learning Outcomes: Students will be able to understand a) Concepts of Risk Management b) Risk Management Measurement c) Risk Management using Forward and Futures d) Risk Management using Options and Swaps.

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Unit - I: Introduction to Risk Management: Risk Management Overview - Types of Risks -Impact of risk on organizations- scope of risk management- Risk Management Levels, Risk management process - risk models- Risk identification and measurement.

Unit - II: Risk Management and Measurement: Risk Management Tools, Regulatory Framework - Capital Adequacy requirements - interest rate risk, liquidity risk, Market risk, credit risk, exchange rate risk, Value at Risk (VaR), Cash Flow at Risk (CaR).

Unit - III: Risk Management Techniques - Forward and Future Contracts: Pricing Forward Contracts, Foreign Currency Forward Contract, Commodity forward contract, Counterparty risk in the forward contract, Future Contracts, Cash Vs Physical Delivery, Pricing Future contracts, The role of expected future spot price, Impact of Financial market imperfections.

Unit – IV: Risk Management Techniques - Options: Structure of Option Market, Types of Options, Option Strategies, exercise price and option values, Principles of Call option Pricing and put option pricing, Put - Call parity theorem, Option values and cash payouts, Option pricing, Arbitrage pricing and the Binomial Model, The Black- Scholes and Mertin Model.

Unit - V: Risk Management Techniques – SWAPS: SWAP Market and its Evolution, Pricing and valuing - Interest rate swap, Pricing and valuing - Currency Swap, Pricing and valuing - Equity Swap, Pricing and valuing – Commodity Swap, Swapations.

Suggested Readings:

- Don M Chance, Robert Brooks, An Introduction to Derivatives and Risk Management, 9e,2013.
- R. Madhumathi & M. Ranganatham, Derivatives and Risk Management, Pearson, 2012.
- Greorge E Rejda, Principles of Risk Management and Insurance, Pearson,2005.
- Rene M. Stulz, Risk Management & Derivatives, Cengage Learning, 2003.
- Jayanth Rama Varma, "Derivatives and Risk Management", TMH.
- Hull, Risk Management and Financial Institutions, Wiley, 2015.
- Prakash B.Yaragol, Financial Derivatives, Vikas, 1e, 2018.

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MBA HUMAN RESOURCES ELECTIVE

21MBA19H1: PERFORMANCE MANAGEMENT SYSTEMS

Course Objective: To understand about performance management and reward system andcommunicating to enhance employee performance.

Learning Outcome: Students will be able to understand a) Significance of Performance Management

b) Communication of Performance Management c) Performance Management and Development ofEmployees d) Reward System, e) other performance related concepts.

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Unit - I: Performance Management: Scope and Significance - Advantages of Performance Management - Organizational Structure - Impact of Organizational structure and Operational Problems Performance management process - Performance Planning - Performance Appraisal - Performance Mentoring - Performance Management Strategic Planning.

Unit - II: Communication of Performance Expectations: Job Description - Defining Performance and choosing a measurement approach measuring results and Behaviors. Gathering performance Information – Presentation, Information and Taking Corrective action – Metrics- Types of Metrics - Critical Success Factors Indicators– managing Metrics- Ownership and Responsibility.

Unit - III: Performance Management and Employee Development: Performance Management Skills, performance Management Framework, Employee Assessment system, Role of HR Professionals in Performance management.

Unit - IV: Reward Systems and Legal Issues: Reasons for introducing contingent Pay Plan,Problems associated with contingent pay plans- Selecting a contingent pay plan- Pay Structures- Job Evaluation- Broad Banding- Legal Principles affecting Performance Management.

Unit - V: Relevant Performance related concepts: Bench marking, Six Sigma, Competency Mapping, Balance Score card, Coaching and Mentoring Pygmalion effect, Job Analysis, High Performance Work Teams, Steps for Building High Performance Work Teams, Reward Practices in World- Class Organizations.

Suggested Readings:

- Soumendra Narian Bagchi, Performance Management, 2e, Cengage Learning 2013.
- Herman Aguinis, Performance management, 3e, Pearson, 2014.
- A S Kohli, T.Deb, Performance Management, Oxford Higher Education, 2012.
- Prem Chadha, Performance Management, Macmillan, 2012.
- Anjali Ghanekar, Essentials of Performance Management, Everest Publishing House, 2010.
- Arup Varma, Pawan S. Budhwar, Angelo S. DeNisi, Performance

Management Systems: AGlobal Perspective, Routledge, 2008.

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MBA HUMAN RESOURCES ELECTIVE

21MBA20H2: LEARNING AND DEVELOPMENT

Course Objective: To understand the concept of Learning with emphasis on training andDevelopment and its role in organizational Development.

Learning Outcome: Students will be able to understand a) the importance of Learning performance

b) Training and Development c) Training Need Analysis d) Training Methods

Unit - I: Introduction to Learning: Concepts of Learning, Phases in Learning, Learning theories - Reinforcement theory, Social learning Theory, Goal theories, need theories, expectancy theory, Adult Learning theory Information Processing Theory, The Learning Process, The Learning Cycle, Instructional emphasis for learning outcomes.

Unit – II: Training Strategy and Designing Training: The evolution of Training's Role, Strategic Training and development Process, Training needs in different strategies, Models of Training Department. Training needs Assessment, Reasons for planned training. Designing the training program, developing the group and the climate, Trainers and training styles, Evaluating training and Follow-on support.

Unit - III: Training methods - Traditional methods- Presentation methods, Hands-on methods, Group Building Methods, e-learning and use of technology in training- Technology influence on training and learning, Technology and multimedia, computer- based training, developing effective online learning, blended learning, mobile technology and training methods, technologies for training Administration.

Unit – IV: Development: Employee development, Essential ingredients of Management Development, Strategy and Development, Approaches to Employee Development – Formal education, Assessment, Job experiences, Interpersonal Relationships, the development Planning Process, company's strategies for providing development, e-learning and employee development. Electronic MDPs.

Unit - V: Contemporary issues in Training and Development: Orientation training, diversity training, sexual harassment training, team-training, cross functional teams, cross cultural training, training for talent management and competency mapping. Career Management, career management systems, Career paths, Career Plateauing, Coping with career breaks, Training for virtual work arrangements.

Suggested Readings:

- Raymond A Noe, Amitabh Deo Kodwani, Employee Training and Development, McGrawHill, 7e, 2019.
- Rolf Lynton, Uday Pareek, Training for Development, Sage, 2012.
- P. Nick Blanchard, James W. Thacker, A. Anand Ram, Effective Training, 4e, Pearson,2012.

- Jean Barbazette - Training Needs Assessment: Methods, Tools, and Techniques-Wiley,2014
- G. Pandu Naik, Training and Development, Excel Books,2011.
- Steve W.J. Kozlowski, Eduardo Salas, Learning, Training, and Development in Organizations,Routledge, 2010.

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MBA HUMAN RESOURCES ELECTIVE

21MBA21H3: MANAGEMENT OF INDUSTRIAL RELATIONS

Course objective: To understand of dynamics of Industrial Relations against the backdrop of monitoring and regulatory environment in India.

Learning Outcome: Students will be able to understand a) importance of Industrial Relations b) Collective Bargaining Mechanism c) Parties and role in Industrial Relations d) Labour Legislation aspects.

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Unit - I: Industrial Relations: Economy and the Labour Force in India – Approaches to Industrial Relations – Industrial Relations in Comparative Frame work- Management and Employer organizations – Introduction – origin and growth. Trade Unions- introduction-Definition and objectives-growth and structure of Trade Unions in India-Trade Unions Act, 1926 and Legal framework-Union recognition-Union Problems- Non-Union firms –Management of Trade Unions in India.

Unit – II: Collective Bargaining: Nature and legal framework of collective bargaining – Levels of Bargaining and Agreements- Change in the Labour - management relations in the post-liberalised India- Changes in the legal frame work of collective bargaining, negotiated flexibility, productivity bargaining, improved work relations, public sector bargaining and social security – Negotiating techniques and skills –drafting of an agreement.

Unit - III: Tripartism and Social Dialogue: Types and levels of Tripartism – social dialogue and the Reform Process – Strengthening tripartite social dialogue – Role of government in industrial relations.

Unit - IV: Labour Legislation-I –Factories Act, 1948, Workmen's Compensation Act, 1923, ESI Act, 1948- The Payment of Wages Act, 1936, Minimum Wages Act, 1948, The Payment of Bonus Act, 1965, National wage policy – Contemporary issues in Wage systems.

Unit - V: Labour Legislation - II: Industrial Disputes Act, 1948 - Grievance Handling Employee Grievances – Causes of Grievances –Conciliation, Arbitration and Adjudication procedural aspects forSettlement of Grievances –Standing Orders-Code Discipline. Industrial Disputes: Meaning, nature and scope of industrial disputes - Cases and Consequences of Industrial Disputes –Prevention and Settlement of industrial disputes in India- Employee Participation - Quality of Work Life- Managing good industrial relations.

Suggested Readings:

- C S Venkataratnam: Management of Industrial Relations, Oxford University Press, 2009.
- Memoria and Gauskar: Dynamics of Industrial Relations, Himalaya, 2009
- Arun Monappa: Industrial Relations, TMH, 2009
- Tapamoy Deb: Managing Human Resources & Industrial Relations, Excel,2009
- B D Singh: Industrial Relations & Labour Laws, Excel, 2009.

- Sinha: Industrial Relations, Trade Unions and Labour Legislation, Pearson, 2009.

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MBA HUMAN RESOURCE ELECTIVE

21MBA24H4: INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Objective: To understand the growing significance of international Human Relations management in the context of Global workforce.

Learning Outcome: Students will be to understand a) Cultural aspects of IHRM b) Role of IHRM in Successful MNC c) Global human Resource Planning d) Training and development of Global employees e) Performance Management of Global employees.

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Unit - 1: Introduction and Overview- Global Market Context-Key Perspective in Global Workforce Management - **Cultural Foundations of International Human resource Management**- Understanding culture-Major models of National Culture-final Caveats on Culture and Global Workforce Management- **Changes and challenges in the Global Labor Market**- Globalization- Technological Advancement- change in labour force Demographics and Migration-Emerging on the contingent workforce- Offshore sourcing- global workforce Management challenges.

Unit - II: The key role on International HRM in Successful MNC Strategy-Knowledge Transfer- Global Leadership training and Development-Strategic Control Needs-Competitive strategy of Multinational corporations-Structuring for Optimal global Performances- Linking Human Resource management practices to Competitive Strategy and Organization Structure-Paradigm Shift of international Human Resource Management form contingency model to Process Development.

Unit - III: Global Human Resource Planning – From strategy to Decision about work Demand and labour supply External Environment Scanning- Job Design for Meeting global Strategy work demand HR planning for the Long term-**Global Staffing**: General Actors Affecting Global Staffing-Global Recruitment of Human Resources-Global selection of Human Resources.

Unit - IV: Global Workforce Training and Development: Strategic role of Training and Development in the global Market Place- Fundamental concepts and principles for Guiding global Training and Development- Training imperative for the global workforce- **Managing International Assignments-** Expatriate Preparation, Foreign Assignment an Repatriation-International Assignments considerations for Special Expatriates-New and Flexible International Assignments.

Unit - V: Global workforce performance Management: Performing Management Process-Important consideration for Global Performance Management-Planning and Implementing Global Performance Appraisal- **Compensation for a Global workforce-** Managing Compensation on a global Scale: Fundamental Practices-Key compensation for Expatriates, HCN's and TNC's – **Global Employee Relations**-current ER issues-Influence of MNC's and Union on Global ER.

Suggested Readings:

- Charles M Vance and Yongsunpaik, Managing Global Work force, PHI, 2009.
- Mark E. Mendenhall, Gary R. Oddou, Gunter K.Stahl, Reading and Cases in InternationalHuman Resource Management, Routledge, Fourth Edition, 2007.
- Tony Edwards and Chris Rees: International Human Resource Management, Pearson, 2009.
- S.C. Gupta, International Human Resource Management, Trinity, 2e, 2017.
- Nilanjan Sengupta, Mousumi S. Bhattacharya, Excel Books, 2007.
- Peter Dowling, International Human Resource Management: Managing People in aMultinational Context, 5e, Thomson, 2008.
- S. K. Bhatia, International Human Resource Management, Deep & Deep Publications, 2005.

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MBA HUMAN RESOURCE MANAGEMENT ELECTIVE
21MBA25H5 LEADERSHIP AND CHANGE MANAGEMENT

Course Objective: To understand leadership traits, styles and theories to manage change in theorganization

Learning Outcome: Students will be able to understand a) Leadership, Role and function of a Leader

b) Leadership theories and styles c) Organizational change concepts d) Perspectives of change e)Strategies for Managing change

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Unit - I: Introduction to Leadership – Leadership, role and functions of a Leader, Leadership motives Characteristics of an Effective Leader, Leadership as a process - the complexities of leadership - Effective leadership behaviors and attitudes – Leadership and power, coercion, Management, Trait approach, Leadership Behaviour and styles – Lewin's Leadership styles, Ohio state Leadership study, The University of Michigan Study, Blake and Mouton's Managerial Grid.

Unit – II: Leadership Theories and styles: Contingency theories of Leadership-Fiedler's Contingency Model, The path-Goal Theory, The Hersey - Balanchard Situational Leadership Theory, Transformational Leadership, Transactional Leadership Style, Charismatic Leadership. Leadership and Empowerment, Servant leadership, Team leadership, Leadership Ethics.

Unit - III: Organizational Change – Change, Nature of organizational change – Sources of change - Environmental triggers of Change, Organizational responses to change, Impact of change on organisations - Resistance to change. Types of change, changing faces of change, Predictable Change, Diagnosing change situation. Perspectives on change - Contingency Perspective - Resource dependence Perspective - Population ecology Perspective - Institutional perspective.

Unit - IV: Organizations for Change: Organizational Structure, Models of Structure, Influences on structure, Organizational structure and change. Organizational Culture, dimensions of organizational culture, sources of organizational culture, Organizational culture and change, Organizational politics, The link between politics, power and conflict, Power and conflict in times of change, Management andleadership, Leadership in times of change. Cultural factors influencing leadership practice.

Unit - V: Strategies for Managing Change: Systematic approaches to Change, The hard systems model of change, Soft systems models of change – Organizational Development, The OD process, OD-an action –research based model of change, Factors for effective change – Demographic changes, changing lifestyles, occupational changes, Operating Virtually, The multiple paths to change. Developing Leadership Skills.

Suggested Readings:

- Gary Yulk, Nihanth Uppal, Leadership in organizations, Pearson,3e, 2019.
- Ranjana Mittal, Leadership Personal Effectiveness and Team

building, VikasPublictaions,2015

- Peter G. Northhouse, Leadership Theory and Practice, Sage Publications, 2011.
- Barbara Senior, Jocelyne Fleming, Organizational Change, 3e, Pearson publications,2010
- Mark Hughes, Managing Change, Universities Press,2011.
- Nic Beech and Robert Maclntosh, Managing Change, Cambridge University Press, 2012.
- Alfranch Nahavandi, The Art and science of Leadership, Pearson,7e, 2018

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MBA HUMAN RESOURCE MANAGEMENT ELECTIVE

21MBA26H6: TALENT AND KNOWLEDGE MANAGEMENT

Course Objective: To understand the importance of nurturing talent and managing knowledge in the organization.

Learning Outcome: Students will be able to understand a) Talent Management Process b) Succession and career planning approaches c) Knowledge management aspects d) Knowledgemanagement assessment and solutions

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Unit – I: Talent Management: Meaning, importance, Evolution, Talent Management System, Talent Reservoir – Components, Talent Management Grid, Talent Management Assessment Tools, Process of Talent Management, Competence –Core Competency, Competency Assessment, Competency Modeling – Steps in developing a valid competency model, Potential Forecast.

Unit – II: Succession and Career Planning: Succession Planning – Traditional Approaches, Contemporary Approaches, Talent Acquisition - Talent Identification & Business Alignment, Recruiting& Assessment, Talent Development – Training & Coaching – Action-Oriented Coaching, Remedial Coaching, Attitude Based Coaching; Performance Based Coaching, Executive Coaching, Talent Management Strategies.

Unit – III: **Knowledge Management:** Concept, Forces Driving Knowledge Management, Knowledge Management Systems, Issues in Knowledge Management, Knowledge Management Strategies, Technologies for Knowledge Management, Factors influencing Knowledge Management.

Unit – IV: Nature of Knowledge: Data, Information, Knowledge, Wisdom, Views of Knowledge – Subjective and Objective, Types of Knowledge – Location of Knowledge – Knowledge in People, Knowledge in Artifacts, Knowledge in Organizational Entities, Knowledge Management Assessment – Types of Assessment, Importance of KM Assessment.

Unit – V: Knowledge Management Solutions: Knowledge Management Processes – Discovery, Capture, Sharing, Mechanisms, Technologies, Knowledge Management Approaches – Hansen-Earl's Seven Schools of Knowledge Management, Alversson and Karreman's knowledge management, Knowledge Management Infrastructure, Organizational Impacts of Knowledge Management – on People, on Processes, on Products, on Organizational Performance.

Suggested Readings:

- Lance A Berger, Dorothy R Berger, The Talent Management Handbook, 2e, TMH, 2008
- Irma Becerra-Fernandez, Avelino Gonzalez, Rajiv Sabherwal, Knowledge Management:Challenges, Solutions, and Technologies, Pearson, 2009
- Sudhir Warier, Knowledge Management, Vikas, 2004.
- Ravinder Shukla, Talent Management: Process of Developing and Integrating SkilledWorkers, Global India Publications, 2009.

- Marshall Goldsmith, Louis Carter, Best Practices in Talent Management: How the World'sLeading Corporations, Wiley ,2010.
- Hugh Scullion, David G. Collings, Global Talent Management, Routledge, 2011.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA ENTREPRENUERSHIP ELECTIVE
21MBA19E1: STARTUP MANAGEMENT

Course Objective: To understand New venture creation opportunities, its resources andrequirements for Enterprise Startup.
Learning Outcome: Students will be able to understand a) Startup opportunities b) Legal and otherrequirements for new ventures c) Financial Issues of startups d) Sustainability and growth of startups
e) Exit strategies

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Unit - I: Startup opportunities: The New Industrial Revolution – The Big Idea- Generate Ideas with Brainstorming- Business Startup - Ideation- Venture Choices - The Rise of The startup Economy - The Six Forces of Change - The Startup Equation- The Entrepreneurial Ecosystem –Entrepreneurship in India. Government Initiatives.

Unit - II: Startup Capital Requirements and Legal Environment: Identifying Startup capital Resource requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics - The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

Unit - III: Starting up Financial Issues: Feasibility Analysis - The cost and process of raising capital
- Unique funding issues of a high-tech ventures - Funding with Equity – Financing with Debt- Funding startups with bootstrapping- crowd funding- strategic alliances.

Unit - IV: Startup Survival and Growth: Stages of growth in a new venture- Growing with the market
- Growing within the industry- Venture life patterns- Reasons for new venture failures- Scaling Ventures - preparing for change - Leadership succession. Support for growth and sustainability of the venture.

Unit - V: Planning for Harvest and Exit: Dealing with Failure: Bankruptcy, Exit Strategies- Selling the business - Cashing out but staying in-being acquired- Going Public (IPO) – Liquidation.

Suggested Readings:

- Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, CengageLearning, 2016.
- Anjan Raichaudhuri, Managing New Ventures Concepts and Cases, Prentice HallInternational, 2010.
- S.R. Bhowmik & M. Bhowmik, Entrepreneurship, New Age International, 2007.
- Steven Fisher, Ja-nae' Duane, The Startup Equation -A Visual Guidebook for Building YourStartup, Indian Edition, Mc Graw Hill Education India

Pvt. Ltd, 2016.

- Donald F Kuratko, Jeffrey S. Hornsby, New Venture Management: The Entrepreneur's RoadMap, 2e, Routledge, 2017.
- Vijay Sathe, Corporate Entrepreneurship, 1e, Cambride, 2009.
- Bruce R. Barringer, R.Duane Ireland, Entrepreneurship successfully, launching newventures.Pearson,2019

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA ENTREPRENUERSHIP ELECTIVE

21MBA20E2: MSME MANAGEMENT

Course Objective: To understand the setting up and management of MSMEs and initiatives of Government and other institutions support for growth and development of MSMEs.

Learning Outcome: Students will be able to understand a) Issues and Challenges in MSMEs b) Setting up of MSMEs c) Management of MSMEs d) Institution and Government support.

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Unit - I: Introduction for Small and Medium Entrepreneurship (SME): Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs

Unit - II: Setting of SMEs': Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies, Rural entrepreneurship – Women entrepreneurship.

Unit - III: Institutions supporting MSMEs: –Forms of Financial support, Long term and Short-term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions, Central level institutions, State level institutions, Other agencies, Commercial Bank – Appraisal of Bank for loans. Institutional aids for entrepreneurship development – Role of DST, SIDCO, NSIC, IRCI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureaus.

Unit - IV: Management of MSME: Management of Product Line; Communication with clients - Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies — Evaluating entrepreneurial performance

Unit - V: Role of Government in promoting Entrepreneurship: MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Suggested Readings:

- Poornima M Charanthimath, Entrepreneurship Development Small Business Enterprises,Pearson,3e, 2019.
- Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya Publishing House,2003.
- Paul Burns & Jim Dew Hunt, Small Business Entrepreneurship, Palgrave Macmillanpublishers, 2010.
- Suman Kalyan Chaudhury, Micro Small and Medium Enterprises in India

Hardcover, RajPublications, 2013.

- Aneet Monika Agarwal, Small and medium enterprises in transitional economies", challengesand opportunities, DEEP and DEEP Publications.
- S.S. Khanka, Entrepreneurial Development, S. Chand, 2017
- Norman H Scarborough, Jeffrey R. Cornwall, Essentials of Entrepreneurship and SmallBusiness Management, Pearson, 2017.

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MBA ENTREPRENUERSHIP ELECTIVE

21MBA21E3: FAMILY BUSINESS MANAGEMENT

Course Objective: To understand the importance of family-owned businesses for achieving Competitive advantage in the market place.

Learning Outcome: Students will be able to understand a) Perspectives in Family Business b) Ownership Challenge and Family Governance c) Successor Development strategies d) Strategic Planning and Transgenerational Entrepreneurship e) New Leaders of the Evolution and Change.

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Unit - I: Introduction to Family Business: Family Business as a unique synthesis- Succession and Continuity: The three-generation rule- Building Family business that last- The systems theory model of Family Business - Agency Theory of Family business - The stewardship perspective of family business - Competitive Challenges and Competitive advantages of family businesses- The role of Genograms and family messages to understand the family system. Family emotional intelligence - The ECI-U Model.

Unit - II: Ownership Challenges and Family Governance: Shareholder Priorities – Managers vs Owners - Responsibilities of shareholders to the company - Effective Governance of the shareholder - firm relationship – Family Governance: Structure, Challenges to family governance, Managing the challenges of succession. Enterprise Sustainability: Twelve elements of strategic –fit and its implications on family firms.

Unit - III: Successor Development: Characteristics of next-generation leaders- Next-generation attributes, interests and abilities for responsible leadership- Next-generation personalities-managing interdependence- CEO as an architect of succession and continuity - Types of CEO Spouse and the transfer of power.

Unit - IV: Strategic Planning and Transgenerational Entrepreneurship: Life cycle stages influencing family business strategy - Turning core competencies into competitive advantage - The unique vision of family-controlled businesses - Strategic regeneration- The Business Rejuvenation matrix - Intrapreneurship.

Unit - V: The Future of Family Business: New Leaders of the Evolution - Three states of evolution- Continuity and culture - changing the culture - The change formula - Organization Development approaches to change - Commitment planning - Organic competencies and business's future - Thriving through competition - Institutionalizing the change.

Suggested Readings:

- Ernesto J. Poza, Mary S. Daughterty, Family Business, 4e, Cengage Learning, 2015.
- Frank Hoy, Pramodita Sharma, Entrepreneurial Family Firms, Prentice Hall, 2010
- Sudipt Dutta, Family Business in India, Sage Publications, 1997.

- Laura Hougaz, Entrepreneurs in Family Business Dynasties: Stories of Italian-Australian Family Businesses over 100 years, Springer, 2015.
- John L. Ward, Keeping the Family Business Healthy: How to Plan for Continuing Growth, Profitability and Family Leadership, Palgrave Macmillan, 2011.
- M. Nordqvist, T. Zellweger, Transgenerational Entrepreneurship: Exploring Growth and Performance in Family Firms Across Generations, Edward and Elgar Publishing Limited, 2010.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA ENTREPRENUERSHIP ELECTIVE

21MBA24E4: ENTREPRENEURIAL FINANCE

Course Objective: To understand the role of Entrepreneurial Finance, Planning and valuation of an Enterprise.

Learning Outcome: Students will be able to understand a) Financing through venture life cycle b) Organizing and operating the enterprise c) Financial Planning of an enterprise d) Valuation of an enterprise e) Financing for growing enterprises.

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Unit - I: Finance for Entrepreneurs: Principles of Entrepreneurial Finance- Role of Entrepreneurial Finance- The successful venture life cycle- Financing through venture lifecycle- Life Cycle approach for teaching - Entrepreneurial finance. Developing Business Idea, Business Model. Screening venture opportunities: Pricing / Profitability considerations, Financial / harvest Considerations. Financial Plansand Projections.

Unit - II: Organizing and Operating the Venture: Financing a New venture, Seed, Startup and First Round Financing Sources- Financial Boot Strapping, Business Angel Funding, First Round Financing Opportunities. Preparing and Using Financial Statements: Obtaining and Recording the resources to start and Build a new venture, Asset and Liabilities and Owners Equity in Business, Sale expenses and profits Internal Operating Schedules, Statement of cash flows, Operating Breakeven Analysis. Evaluating operating and financial performance using ratio analysis.

Unit - III: Financial Planning: Financial Planning throughout the Venture's life cycle, Short Term cash planning tools, Projected monthly financial statements. Types and costs of Financial Capital: Implicit and Explicit financial capital costs, Financial Markets, Determining the cost of Debt Capital, Investment Risk, Estimating the cost of Equity Capital, Weighted average cost of capital.

Unit - IV: Venture Valuation: Valuing Early stage Ventures, Venture Worth, Basic Mechanics of valuation, developing the projected financial statements for a discounted Cash Flow Valuation, Accounting Vs Equity Valuation Cash Flow. Venture Capital Valuation Methods: Basic Venture Capital Valuation Method, Earnings Multiplier and Discounted Dividends.

Unit - V: Financing for the Growing Venture: Professional Venture Capital, Venture Investing Cycle, Determining the fund objectives and policies, Organizing the new fund, Soliciting investments in the new fund, Capital Call, Conducting due diligence and actively investing, arranging harvest or liquidation, Other financing alternatives: Facilitators, Consultants and Intermediaries, Banking and Financial Institutions, Foreign Investors, State and Central Government Financing Programmes. Receivables Lending and Factoring, Mortgage Lending, Venture Leasing.

Suggested Readings:

- Leach/ Melicher, Entrepreneurial Finance, 5e, 2015.
- Steven Rogers, Entrepreneurial Finance: Finance and Business Strategies for the SeriousEntrepreneur 3e, Tata Mc Graw Hill, 2014.
- Douglas Cumming, Entrepreneurial Finance, Oxford University Press, 2012.
- M J Alhabeeb, Entrepreneurial Finance: Fundamentals of Financial Planning andManagement for Small Business, Wiley, 2015.
- Philip J. Adelman, Alan M. Marks, Entrepreneurial Finance, 5e, Pearson, 2011.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA ENTREPRENUERSHIP ELECTIVE

21MBA25E5: ENTREPRENEURIAL MARKETING

Course Objective: To understand the marketing challenges and to apply marketing tools and models for entrepreneurial marketing.

Learning Outcome: Students will be able to understand a) Marketing mix of an enterprise b) Growth and marketing strategies c) Market Development strategies d) Contemporary issues in Entrepreneurial marketing.

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Unit – I: Introduction to Entrepreneurial Marketing – Meaning, Characteristics, Functions, Marketing Challenges, and Marketing Mix (6P's). Identifying entrepreneurial marketing opportunities, market research, demand forecasting.

Unit – II: Enterprise Growth: Concept of Enterprise Growth, forms, types, structures of organisational growth, Gazelles and Mice, Growth Objectives – operative and strategic targets, Growth Analysis – Portfolio analysis, ERRC Grid, SWOT-analysis, and raising entrepreneurial finance.

Unit – III: Growth Strategies and Models: Growth Strategies – concept and forms, Internal, External and Co-operative growth strategies. Growth models - Life-cycle and Phase model, integrated life- cycle model (evolutionary), Greiner's growth model (revolutionary), and Complexity management (process) model.

Unit – IV: Entrepreneurial Market Development Strategies: Positioning, Segmentation, targeting, entrepreneurial communication strategy, entrepreneurial pricing strategy, entrepreneurial distribution strategy, building customer relationships, marketing plans.

Unit – V: Entrepreneurial Marketing Tools: Concept, Guerrilla Marketing, Ambush / Free ride Marketing. Tools of entrepreneurial marketing – Buzz, Social Media, Viral Marketing.

Suggested Readings:

- Edwin J. Nijssen, Entrepreneurial marketing An Effectual Approach 2e, Routledge, 2017.
- Leonard Lodish, Howard Lee Morgan, Amy Kallianpur, Entrepreneurial Marketing, WileyPublishers, 2001.
- Zubin Sethna, Paul Harrigan, Rosalind Jones, Entrepreneurial Marketing: GlobalPerspectives, Emerald Group Publishing, 2013.
- Bruce D. Buskirk, Molly Lavik, Entrepreneurial Marketing: Real Stories and SurvivalStrategies, Thomson, 2004.
- Ian Chaston, Entrepreneurial Marketing: Sustaining Growth in All Organisations, PalgraveMacmillan, 2016.
- Marc Longman, Entrepreneurial Marketing: A Guide for Startups & Companies With GrowthAmbitions, Garant Publishers, 2011.

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MBA ENTREPRENUERSHIP ELECTIVE

21MBA26E6: CREATIVITY, INNOVATION AND ENTREPRENEURSHIP

Course Objective: To understand the creativity and innovations management aspects in an enterprise.

Learning Outcome: Students will be able to understand a) basics of Creativity b) Creative Problem- solving c) Creative Intelligence d) Perspectives of Innovation

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Unit - I: The Creativity Phenomenon: Creative Cerebration- Creative Personality and Motivation – Creative Environment- Creative Technology- Creativity Training- Puzzles of Creativity- Spiritual and social roots of creativity- Essence, Elaborative and Expressive Creativities- Quality of Creativity- Existential, Entrepreneurial and Empowerment Creativities – Criteria for evaluating Creativity- Credible Evaluation- Improving the quality of our creativity.

Unit - II: Mastering Creative Problem Solving: Structuring of ill- defined problems- Creative Problem solving- Models of Creative problem solving- Mechanisms of Divergent thinking- Useful mechanisms of convergent thinking- Techniques of Creativity Problem solving-

Unit - III: Creative Intelligence: Creative Intelligence abilities - A model of Creative Intelligence - Convergent thinking ability - Traits Congenial to creativity - Creative Personality and forms of creativity- Motivation and Creativity- Blocks to creativity- fears and Disabilities- Strategies for Unblocking- Energy for your creativity- Designing Creativogenic Environment.

Unit - IV: Innovation Management: Concept of Innovation- Levels of Innovation- Incremental Vs Radical Innovation-Inbound and Outbound Ideation- Open and Other Innovative Ideation Methods- Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

Unit - V: Micro and Macro Perspectives of Innovation: Systems Approach to Innovation- Innovation in the context of Emerging Economies- Organizational factors affecting innovation at the firm level- Leadership and Innovations- Open Innovation- Innovation Framework- Innovations developed by Open Technology Communities.

Suggested Readings:

- Pradip N Khandwalla, Lifelong Creativity, An Unending Quest, Tata Mc Graw Hill, 2004.
- Paul Trott, Innovation Management and New Product Development, 4e, Pearson, 2018.
- Vinnie Jauhari, Sudanshu Bhushan, Innovation Management, Oxford Higher Education, 2014.
- Innovation Management, C.S.G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House,2010.
- A. Dale Timpe, Creativity, Jaico Publishing House, 2003.
- Brian Clegg, Paul Birch, Creativity, Kogan Page, 2009.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS
(Affiliated to Jawaharlal Nehru Technological University, Hyderabad)
(AUTONOMOUS INSTITUTION)
MASTER OF BUSINESS ADMINISTRATION MBA (Regular) R-22
Effective from Academic Year 2022-23 Admitted Batch

COURSE STRUCTURE AND SYLLABUS

I Year I Semester

Course Code	Course Title	L	T	P	Credits
22MBA01	Management and Organizational Behavior	4	0	0	4
22MBA02	Business Economics	4	0	0	4
22MBA03	Financial Reporting & Analysis	4	0	0	4
22MBA04	Research Methodology and Statistical Analysis	4	0	0	4
22MBA05	Legal and Business Environment	4	0	0	4
Open Elective-I 22MBA06	6A Business Ethics and Corporate Governance 6B Project Management 6C Sustainability Management 6D Cross Cultural Management	3	0	0	3
22MBA07	Business Communication Lab	0	0	2	2
22MBA08	Statistical Data Analysis Lab	0	0	2	2
	TOTAL	**23**	**0**	**4**	**27**

I Year II Semester

Course Code	Course Title	L	T	P	Credits
22MBA09	Human Resource Management	4	0	0	4
22MBA10	Marketing Management	4	0	0	4
22MBA11	Financial Management	4	0	0	4
22MBA12	Quantitative Analysis for Business Decisions	4	0	0	4
22MBA13	Entrepreneurship and Design Thinking	4	0	0	4
22MBA14	Logistics & Supply Chain Management	4	0	0	4
Open Elective-II 22MBA15	15A Total Quality Management 15B Marketing Research 15C International Business 15D Rural Marketing	3	0	0	3
	TOTAL	**27**	**0**	**0**	**27**

Internship during Summer vacation (after Semester –II)

II Year I Semester

Course Code	Course Title	L	T	P	Credits
22MBA16	Production & Operations Management	4	0	0	4
22MBA17	Management Information Systems	4	0	0	4
22MBA18	Business Analytics	4	0	0	4
22MBA19 M1/H1/FI/E1	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA20 M2/H2/F2/E2	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA21 M3/H3/F3/E3	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA22	Summer Internship	0	0	2	2
	TOTAL	**24**	**0**	**2**	**26**

II Year II Semester

Course Code	Course Title	L	T	P	Credits
22MBA 23	Strategic Management	4	0	0	4
22MBA 24 M4/H4/F4/E4	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA25 M5/H5/F5/E5	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA26 M6/H6/F6/E6	(MRKG/HRM/FIN/ENTP)	4	0	0	4
22MBA27	Pre-submission project Seminar	0	0	2	2
22MBA28	Main Project Viva-Voce	0	0	4	4
	TOTAL	**16**	**0**	**6**	**22**

LIST OF ELECTIVE SUBJECTS

Students have to select any One Specialization (Marketing, Finance, Human Resources, and Entrepreneurship) and he/she needs to select the Core Elective subjects listed under the chosen specialization only.

Course Code	Specialization	Credits
	MARKETING	
22MBA19M1	Digital Marketing	4
22MBA20M2	Sales and Promotion Management	4
22MBA21M3	Consumer Behavior	4
22MBA24M4	International Marketing	4
22MBA25M5	Services Marketing	4
22MBA26M6	Marketing Analytics	4
	FINANCE	
22MBA19F1	Security Analysis and Portfolio Management	4
22MBA20F2	Risk Management and Financial Derivatives	4
22MBA21F3	Strategic Cost and Management Accounting	4
22MBA24F4	International Financial Management	4
22MBA25F5	Strategic Financial Management	4
22MBA26F6	Financial Analytics	4
	HUMAN RESOURCES	
22MBA19H1	Talent and Performance Management Systems	4
22MBA20H2	Learning and Development	4
22MBA21H3	Employee Relations	4
22MBA24H4	International Human Resource Management	4
22MBA25H5	Leadership and Change Management	4
22MBA26H6	HR Analytics	4
	ENTREPRENEURSHIP	
22MBA19E1	Startup and MSME Management	4
22MBA20E2	Technology Business Incubation	4
22MBA21E3	Innovation and Entrepreneurship	4
22MBA24E4	Entrepreneurial Finance	4
22MBA25 E5	Entrepreneurial Marketing	4
22MBA26 E6	Family Business Management	4

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - I

22MBA01: MANAGEMENT AND ORGANIZATIONAL BEHAVIOR

Course Objectives:

- To enable students to understand the Evolution, Functions and Theories of Management
- To orient on the aspects of planning and decision-making using relevant management processes
- To impart knowledge on the processes of Organizing and Controlling with the help of various Types of Organization Structures
- To describe the various aspects of individual and group behaviours in an organizational setting
- To elaborate on the impact of leadership and motivation for employee high performance

Course Outcomes: Students will be able to:

- Gain understanding of the Concepts of Management, its Evolution, Functions and the Theories contributed by various Management Thinkers.
- Learn the process of planning, goal setting and the process of decision making with the help of various models.
- Learn the processes of Organizing and Controlling with the help of various Organizational Structures.
- Appreciate the relevance of Individual and group behaviour in an organization and the role of Culture and dynamics
- Identify different Leadership Styles, Skills and the Theories of Motivation

Unit – I: Introduction to Management: The Management Process, Management Functions, Kinds of Managers, Managerial Roles and Skills. Evolution of Management, Theories of Management: Classical, Scientific, Administrative and Behavioral. Management Sciences Theories: Systems and Contingency Theory.

Unit – II: Planning and Decision Making: Planning and Goal Setting, Organizational Planning, Vision, Mission and Goals, Types of Plans, Steps in Planning Process, Approaches to Planning, Planning in Dynamic Environment. Decision-making Process, Types of Decisions, Decision Making Styles, Vroom's Participative Decision-making Model.

Unit – III: Organizing and Controlling: Organizational Structure, Principles of Organizing, Authority, Power and Influence, Designing Organizational Structure. Mechanistic and Organic Structures, Contemporary Organizational Design and its Challenges.
Controlling: The Control Process, Controlling for Organizational Performance, Types of Control, Financial Controls, Balanced Scorecard, Bench Marking, Contemporary issues in Controlling.

Unit – IV: Organizational Behavior: Individual and Group Behavior: Importance of Organizational Behavior, Culture and Dynamics of Diversity, Personality Theories, Perception, Formation of Group Behavior, Classification of Groups, Group Properties, Group Cohesiveness, Building Teams.

Unit – V: Leadership and Motivation: Leadership Traits, Leadership Styles, Leadership Theories, Power and Politics.
Motivation: Approaches to Motivation, Maslow's Needs Hierarchy Theory, Two-factor Theory of Motivation, McGregor's Theory, ERG theory, McClelland's Needs Theory, Valance Theory.

Suggested Readings:

- K. Aswathappa, Organisational Behaviour, Himalaya Publications, 8e, 2021.
- Harold Koontz, Heinz Weihrich, Mark V Cannice, Essentials of Management, Tata McGraw Hill Education, 11e, 2020.
- Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, Organizational Behaviour, Pearson Education, 18e, 2018.
- Ricky W Griffin, Management Principles and Practices, Cengage Learning, 11e, 2017.
- Richard L. Daft, New Era of Management, Cengage Learning, 11e, 2017.
- Chandrani Singh, Aditi Ktri, Principles and Practices of Management and Organizational Behaviour, Sage Publications, 1e,2016.
- Afsaneh Nahavandi, Robert B. Denhardt, Janet V. Denhardt, Maris P. Aristigueta, Organizational Behaviour, Sage Publications, 1e, 2015.

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MBA SEMESTER - I

22MBA02: BUSINESS ECONOMICS

Course Objectives:

- To provide an understanding of the basic concepts associated with Business Economics.
- To impart the knowledge of various aspects of Demand and Supply
- To highlight the importance of Production and Cost concepts in a Firm.
- To elaborate on the nature of various Market Structures.
- To enable the understanding of various Pricing Strategies

Course Outcomes: Students will be able to

- Understand the Concepts and Principles of Business Economics.
- Learn various concepts and practical applications of Demand and Supply viz. Laws, Types, Elasticity, Forecasting and Equilibrium.
- Learn concepts and applications related to Production and Cost of a firm.
- Learn the features of various Market Structures along with the Decision-making with regards to Price and Output in Short and Long Terms.
- Understand the concepts of Pricing Practices, Theory of Firm and Managerial & Behavioral Theories of a Firm

Unit – I: Introduction to Business Economics: Definition, Nature and Scope, Relationship with Other Disciplines, Business Decision-making Process, Basic Economic Principles: The Concept of Opportunity Cost, Marginalism, Equi-marginalism, Incremental Concept, Time Perspective, Discounting Principle, Risk and Uncertainty.

Unit – II: Theory of Demand and Supply: (a) Demand Analysis: Demand, Demand Function, Law of Demand, Determinants of Demand, Types of Demand. Elasticity of Demand, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Need for Demand Forecasting, Methods of Demand Forecasting. (b) Supply, Supply Function, Determinants of Supply, Law of Supply, Elasticity of Supply. (c) Market Equilibrium.

Unit – III: Production and Cost Analysis: Production Function, Production Function with One and Two Variables, Cobb-Douglas Production Function, Marginal Rate of Technical Substitution, Isoquants and Isocosts, Returns to Scale, Economies of Scale, Innovations and Global Competitiveness. Cost Concepts, Determinants of Cost, Cost-Output Relationship in the Short-run and Long-run, Short-run vs. Long-run Costs, Average Cost Curves, Break Even Analysis.

Unit – IV: Market Structures- Pricing and Output decisions: Classification of Market Structures, Features and Competitive Situations. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly – both the Long-run and the Short-run.

Unit – V: Pricing Strategies: Pricing Policy, Price Discrimination, Cost Plus Pricing, Pricing of Multiple Products, Transfer Pricing, Pricing over Product Life Cycle. Theory of Firm, Managerial Theories and Behavioral Theories of Firm. International Price Discrimination: Dumping, Effects of Dumping.

Suggested Readings:

- D.M. Mithani, Managerial Economics, Himalaya Publishing House, 9e, 2022.
- Satya P. Das & J.K. Goyal, Managerial Economics, Sage Publications, 2e, 2022.
- Dominick Salvatore, Siddhartha K. Rastogi, Managerial Economics, Oxford Publications, 9e, 2020.
- H L Ahuja, Business Economics, S. Chand & Co, 13e, 2019.
- Geetika, Piyali Ghosh, Purba Roy Choudhury, Managerial Economics, Tata McGraw-Hill, 3e, 2018.
- H L Ahuja, Business Economics, S. Chand & Co, 13e, 2019.
- Suma Damodaran, Managerial Economics, Oxford Publications, 2e, 2018.
- P. N. Chopra, Managerial Economics, Kalyani Publishers,1e,2018.

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MBA SEMESTER – I

22MBA03: FINANCIAL REPORTING AND ANALYSIS

Course Objectives:

- To provide understanding of the concepts of Financial Reporting & Analysis.
- To highlight the importance of Accounting Process.
- To elaborate on the methods of inventory valuation.
- To elucidate the management of funds/ cash from operations of the company.
- To impart knowledge of various ratios, analysis and interpretation of financial statements.

Course Outcomes: Students will be able to

- Understand the Concepts and Principles of Accounting.
- Understand the Accounting Process in detail.
- Learn various aspects in depreciation, Inventory and Goodwill.
- Analyze the Working Capital and Flow of Funds and Cash into the Business
- Prepare, analyze and Interpret Financial Statements.

Unit – I: Introduction to Accounting: Importance, Objectives and Principles, Accounting Concepts and Conventions and The Generally Accepted Accounting Principles (GAAP), Their Implications on Accounting System, Double Entry System, Recording Business Transactions, Classification of accounts. Accounting cycle.

Unit – II: The Accounting Process: Overview, Books of Original Record, Journal, Ledger, Trial Balance, Classification of Capital and Revenue Expenses, Final Accounts Trading, P&L Account, Balance Sheet with Adjustments. Concept of Rectification of Errors.
Accounting from Incomplete Records, Advantages and Disadvantages of Single Entry and Double Entry System and the Differences between the two, Preparation of Accounts, and Ascertainment of Profit from Incomplete Records, Accounting Treatment as per the Statement of Affairs Method and Calculation of Missing Figures.

Unit – III: Valuation Models: Valuation of Assets, Tangible vs. Intangible Assets. Inventory Valuation: Methods of Inventory Valuation and Valuation of Goodwill, Methods of Valuation of Goodwill. Depreciation, Methods of Depreciation, their Impact on Measurement of Business Accounting.

Unit – IV: Financial Statement Analysis-I: Statement of Changes in Working Capital, Funds from Operations, Paid Cost and Unpaid Costs. Distinction between Cash Profits and Book Profits, Preparation and Analysis of Cash Flow Statement and Funds Flow Statement, Horizontal Analysis and Vertical Analysis of Company.

Unit – V: Financial Statement Analysis-II: Analysis and Interpretation of Financial Statements, Liquidity, Leverage, Solvency and Profitability Ratios, Valuation Ratios, Du Pont Chart, Accounting Standards Issued by ICAI, Focus on INDAS, International Financial Reporting Standards (IFRS).

Suggested Readings:

- S.N. Maheswari, S. K. Maheshwari, Sharad K. Maheshwari, Accounting for Management, Vikas Publishing House, 5e, 2022.
- Narayanaswamy. R, Financial Accounting: A Managerial Perspective, PHI Learning, 7e, 2022.
- Ambrish Gupta, Financial Accounting for Management, Pearson Education, 7e, 2022.
- Raj Kumar Sah, Financial Accounting, Cengage Learning, 2e, 2020.
- Dhanesh K. Khatri, Financial Accounting & Analysis, Tata McGraw-Hill Publishing Limited, 2015.
- V. Rajasekharan, R. Lalitha, Financial Accounting & Analysis, Pearson Education, 2015.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER – I

22MBA04: RESEARCH METHODOLOGY AND STATISTICAL ANALYSIS

Course Objectives:

- To introduce the basic concepts of Research Methodology.
- To impart knowledge on concepts and types of Research Design; Data and its Collection methods along with various tools used for Data Collection.
- To demonstrate Tabulation and Graphical Representation of One, Two, Three-Dimensional Data; to introduce the concepts of Statistics and Small Sample Tests.
- To highlight the significance of Statistical Tools for analysis and interpretation of Qualitative & Quantitative data
- To introduce the concepts of Time Series and Index Numbers and train on writing Research Reports effectively.

Course Outcomes: Students will be able to:

- Gain a conceptual overview of Research and the relevant concepts to Research.
- Learn the different types of Research Designs, Data Collection Tools and Procedures.
- Use different methods of representing data through Graphs and Tables; gain an overview of Statistics and relevant concepts and conduct Small Sample Tests.
- Learn to solve mathematical problems related to ANOVA (One-way and Two-way), Correlation and Regression.
- Learn the application of Time Series and Index Numbers; appreciate the need for preparing and presenting a structured Research Report.

Unit – I: Introduction to Research: Meaning, Scope, Role of Business Research, Types of Research, Research Process, Conceptualization of Variables and Measurement, Types and Measurement of Variables, Ethics in Business Research.

Unit – II: Research Design: Research Problem, Purpose of Research Design, Types of Research Design: Experimental Research Design, Research Design for Cross Sectional, Longitudinal Studies, Characteristics of Good Research Design, Sampling and its Applications. Data Collection Methods & Tools: Types of Data, Sources and Instruments for Data, Guidelines for Questionnaire, Sampling and its Application. Measurement and Scaling, Reliability and Validity in Measurement of Variables, Sources of Error in Measurement.

Unit – III: a) Tabulation of Univariate, Bivariate and Multivariate Data, Data Classification and Tabulation, Diagrammatic and Graphical Representation of Data. One-Dimensional, Two-Dimensional and Three-Dimensional Diagrams and Graphs. Introduction to Statistics, Measurement of Central Tendency and Dispersion. **b) Small Sample Tests**: t-Distribution, Properties and Applications, Testing for One and Two Means, Paired t-Test, Hypothesis Formulation and Testing.

Unit – IV: a) **Analysis of Variance:** One-Way and Two-Way ANOVA (with and without Interaction). Chi-Square Distribution: Test for a Specified Population Variance, Test for Goodness of fit, Test for Independence of Attributes. b) **Correlation Analysis**: Correlation, Limits for Coefficient of Correlation, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation, Linear and Multiple Regression Analysis, Discriminant Analysis, Exploratory Factor Analysis.

Unit – V: Time Series Analysis and Report Writing:
Components, Models of Time Series, Additive, Multiplicative and Mixed Models, Trend Analysis: Free hand Curve, Semi Averages, Moving Averages, Least Square Methods. **Index Numbers:** Introduction, Characteristics and Uses of Index Numbers, Types of Index Numbers, Unweighted Price Indexes, Weighted Price Indexes, Tests of Adequacy and Consumer Price Indexes. Importance of Report writing, Types of Research Reports, Report Preparation and Presentation, Report Structure, Report Formulation, Guides for Effective Documentation, Research Briefings. Referencing Styles and Citation in Business Management Research.

Suggested Readings:

- Ranjit Kumar, Research Methodology: Step-by-step Guide for Beginners, sage, 4e,2022.
- S.P. Gupta, Statistical Methods, Sultan Chand & Sons, 46e,2021.
- Shashik.Gupta, P Rangi, Research Methodology: Methods, Tools & Techniques, Kalyani Publishers,6e, 2020.
- Donald R Cooper, Pamela S. Schindler, Business Research Methods, Tata Mc Graw Hill, 12e,

2019.
- Deepak Chawla, Research Methodology: Concepts & Cases, Vikas Publishing, 2e, 2016.
- William G Zikmund, Barry J Babin, Jon C. Carr, Atanu Adhikari, Mitch Griffin, Barry J. Babin, Business Research Methods Cengage Learning, 8e, 2016.
- P.C. Tulsian, Bharat Jhunjhunwala, Business Statistics, S. Chand Publishing, 2016.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - I

22MBA05: LEGAL AND BUSINESS ENVIRONMENT

Course Objectives:

- To educate on the Legal and Regulatory Framework for doing business in India.
- To elucidate various aspects in Law of Contract.
- To explain about Negotiable Instruments and RBI guidelines on Digital Transactions.
- To enlighten students the significance of Monetary, Fiscal Policy, Union Budget.
- To impart knowledge of different Business Regulations and Environmental Laws.

Course Outcomes: Students will be able to:

- Understand the Business Laws related to Incorporation of a company.
- Learn the Law of Contract & Sale of Goods
- Learn the salient features of Negotiable Instruments Act 1881
- Learn the Reforms Undertaken by the Government with respect to the challenging business environments.
- Gain insights of the Regulatory Framework in India.

Unit – I: Introduction: Companies Act, 2013, Steps and Procedure for Incorporation of a Company, Appointment of Directors, Powers, Duties, & Liabilities of Directors, Role of Audit and Auditors, Change of Auditors, Related Party Transactions, Company Meetings, Resolutions, Winding-up of a Company.

Unit – II: Law of Contract: Nature and Types of Contract and Essential Elements of Valid Contract, Offer and Acceptance, Consideration, Capacity to Contract and Free Consent, Legality of Object. Unlawful and illegal Agreements, Contingent Contracts, Performance and Discharge of Contracts, Remedies for Breach of Contract.
Contracts-II: Indemnity and Guarantee, Contract of Agency, Sale of Goods Act-1930: General Principles, Conditions & Warranties, Performance of Contract of Sale, Auction Sale and E-Auctions.

Unit – III: Negotiable Instruments Act - 1881: Negotiable Instruments, Promissory Note, Bills of Exchange, & Cheque, Parties to Negotiable Instruments, Types of Endorsements, Holder, Holder in Due-course, Dishonor and Discharge of Negotiable Instruments, Offences by the Companies, Amendments, RBI Guidelines on Digital Transactions.

Unit – IV: Business Environment: Industrial Policy, Five Year Planning, Foreign Direct Investment (FDI), Fiscal Policy, Latest Union Budget, Reforms Undertaken by the Government, Monetary Policy, Banking Sector Reforms, NITI Aayog, Responsibilities and Functions.

Unit – V: Business Regulations and Environment Laws:

a) Consumer Protection Act 2019, Information Technology Act 2000, Cyber Security Competition Act 2002, Intellectual Property Rights.
b) Environmental Law: Water, Air Pollution, Green Tribunal in Protecting Environment, Sustainability Reporting Practices.

Suggested Readings:

- Rajdeep Banerjee, Joyeeta Banerjee, Legal Aspects of Business, Sage Publications, 1e,2022.
- Francis Cherunilam, Business Environment Text & Cases, Himalaya Publications, 13e, 2022.
- Ravinder Kumar, Legal Aspects of Business, Cengage Learning, 5e, 2021.
- Francis Cherunilam, Business Environment Text & Cases, Himalaya Publications, 13e, 2022.
- Akhileshwar Patha, Legal Aspects of Business, TMH, 7e, 2019.
- MC Kuchhal, Vivek Kuchhal, Business Legislation for Management, Vikas, Publishing House, 5e, 2018.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - I

22MBA06A: BUSINESS ETHICS AND CORPORATE GOVERNANCE (OPEN ELECTIVE - I)

Course Objectives:

- To enable understanding of the basic concepts of Business Ethics and Corporate Governance in Indian and Global Context.
- To elaborate on various aspects in Professional Ethics.
- To explain Corporate Governance practices followed in Indian corporate. +
- To enlighten students the significance of Company Board and Governance Ratings.
- To explain different aspects of CSR and Business Council for Sustainable Development (BCSD) India.

Course Outcomes: Students will be able to

- Understand the Need for Business Ethics and Corporate Governance in India.
- Apply Knowledge of Established Methodologies of Solving Professional Ethical Issues.
- Learn Codes and Committees in Corporate Governance.
- Understand the Role of Board in Corporate Governance.
- Assess the Stakeholder perspective of Corporate Governance.

Unit – I: Business Ethics in the Changing Environment: Business Ethics, Levels of Business Ethics, Myths about Business Ethics, Stages of Moral Development Kohlberg's Study, Carol Gilligan's Theory, Principles of Ethics.

Unit – II: Professional Ethics: Introduction to Professional Ethics, Ethics in Production and Product Management, Ethics of Marketing Professionals, Ethics in HRM, Ethics of Finance and Accounting Professionals, Ethics of Advertisement, Ethics of Media Reporting, Ethics of Healthcare Services. Ethical Dilemma, Mounting Scandals, Ethical Issues, Preparatory Ethics: Proactive Steps, Cyber Ethics.

Unit – III: Corporate Governance: Introduction to Corporate Governance, Major Corporate Governance Failures, Need for Corporate Governance, Corporate Governance in India, Theories of Corporate Governance: Agency Theory, Stewardship Theory and Stakeholder Theory, Problems of Governance in Companies, Role of Capital Markets, Regulator, Government in Corporate Governance.
Corporate Governance Codes and Committees: Global Reporting Initiative, OECD Principles, Cadbury Committee Report, Kumara Mangalam Birla Committee Report, Naresh Chandra Committee Report, Narayana Murthy Committee Report, kelkar Committee on GST, SEBI Clause 49 Guidelines, CorporateGovernance Committees.

Unit – IV: Role of Board: Types of Directors Functions of the Board, Structure of the Board, Role of the Board in Subcommittees, Audit, Compensation Committee, Role, Duties and Responsibilities of Directors, Conflicts of Interest, Remedial Actions. Governance Ratings, Merits and Demerits of Governance Ratings.

Unit – V: Corporate Social Responsibility (CSR): Models for Implementation of CSR, Scope of CSR, Steps to attain CSR, Business Council for Sustainable Development (BCSD) India, Ethics and Social Responsibility of Business, Social Responsibility and Indian Corporations, CSR as a Business Strategy for Sustainable Development, CSR Committee, Recent Amendments in Companies Act (Sec: 135)

Suggested Readings:

- Jyotsna G B, R C Joshi: Business Ethics and Corporate Governance, TMH, 1e, 2019.
- C.S.V. Murthy, Business Ethics, Himalaya Publishing House, 1e, 2019.
- C.S.V. Murthy, Business Ethics, Himalaya Publishing House, 1e, 2019.
- A. C. Fernando, Business Ethics and Corporate Governance, Pearson, 2e, 2018.
- Martin J. Ossewaarde, Introduction to Sustainable Development, sage,1e,2018.
- Christine A. Mallin, Corporate Governance, Oxford University Press, South Asia Edition, 4e, 2016.
- T.N. Sateesh Kumar, Corporate Governance, Oxford University Press, 2015.
- Bob Tricker, Corporate Governance Principles, Policies and Practices, Oxford University Press, 2015.

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MBA SEMESTER - I

22MBA06B: PROJECT MANAGEMENT (OPEN ELECTIVE - I)

Course Objectives:

- To provide understanding of management of projects with a special focus on every phase such as project planning, execution, monitoring and evaluation.
- To impart knowledge on various aspects in Project Appraisal.
- To educate on Project Finance Evaluation techniques.
- To explain to students the importance of organizational behaviour in Project Management.
- To elucidate different Control Mechanisms to manage a project.

Course Outcomes: Students will be able to

- Understand and appreciate the importance of Project Management.
- Learn Project Planning, Execution and implementation.
- Apply Project Appraisal Methods to Cash Flows and Corporate Practices of Dividend Payment
- Understand intricacies of Project Evaluation techniques for better decision making.
- Appreciate the significance of Organizational & Team Behaviors in projects.

Unit – I: Introduction: Introduction to Project Management, Project Characteristics, Project Life Cycle, Project Identification, Formulation and Implementation, Project Management in different Sectors: Construction, Services Sector, Public sector and Government Projects. Systems Approach to Project Management.

Unit – II: Project Appraisal: Project Planning, Steps in Project Planning, Scheduling, Project Appraisal, Feasibility Study, Technical, Commercial, Economic, Financial, Management, Social Cost Benefit Analysis, Project Risk Analysis.

Unit – III: Project Finance: Project Cost Estimation, Project Financing, Investment Criteria, Project Evaluation Techniques, Pay Back Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return, Profitability Index, Cash Flows Estimation for New and Replacement Projects, Cost of Capital, Risk Analysis.

Unit – IV: Project Control: Network Diagrams, Network Analysis, Critical Path, Quality Management, Project Execution, Monitoring and Control, Agile Project Management, Scrum, Lean Production and Project Management.

Unit – V: Organizational Behavior in Project Management: Organizational Structure and Integration, Role of Project Manager, Roles in the Project Team, Project Stakeholder Engagement, Leadership in Project Management, Participative Management, Team Building Approach, Conflict Management in Projects, Stress Management.

Suggested Readings:

- Stewart R. Clegg, Torgeir Skyttermoen, Anne Live Vaagaasar, Project Management, Sage Publications, 1e, 2021.
- Jeffrey K. Pinto, Project Management, Pearson Education, 5e, 2020.
- Prasanna Chandra, Projects, Planning, Analysis, Selection, Financing, Implementation and Review, Tata McGraw Hill, 9e, 2019.
- Jack Gido, Jim Clements, Rose Baker, Mind Tap for Successful Project Management, Cengage Learning, 7e, 2018
- John M, Nicholas, Herman Steyn, Project Management for Engineering, Business and Technology, 5e, Routledge, 2017.
- K. Nagarajan, Project Management, New Age International Publishers, 8e, 2017.

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MBA SEMESTER - I

22MBA06C: SUSTAINABILITY MANAGEMENT (OPEN ELECTIVE – I)

Course Objectives:

- To highlight the importance of Business Sustainability Management.
- To impart knowledge of various aspects in Environment and Economic Sustainability.
- To explain Sustainability Process and its strategies.
- To elucidate on the importance of Sustainability in Urban Metabolism.
- To appreciate the importance of Market and Sustainability.

Course Outcomes: Students will be able to

- Understand the importance of Climate change and global warming.
- Learn about environment pollution and sustainability, economic approaches to sustainable development.
- Assess the steps in sustainable planning for competitive advantage.
- Understand sustainable and circular value chain, sustainability marketing.
- Appreciate the relevance of Market Sustainability.

Unit – I: Sustainability and Business: Introduction to Sustainability, Triple Bottomline Approach, Global Reporting Initiative (GRI) Guidelines, Sustainability and Responsibility, Sustainability Framework, Business Engagement with Sustainability, Climate Change and Global Warming, Sustainability Development, Five Steps to Successful Engagement, Difference between Corporate Social Responsibility (CSR) and Sustainability, Current Major Sustainability Trends.

Unit – II: Environment and Economic Sustainability: The Environment and Economic Growth Linkage, Impact of Transport Infrastructure Development, Interconnection of the Environment and Economic Development, Environment Pollution and Sustainability, Economic Approaches to Sustainable Development.

Unit – III: Sustainability Process and Strategies: Process to Achieve Sustainability, Working with Processes, Process Approach and Control, Resource Management, Officious Strategy, Effective Processes, Efficient Processes, Sustainability Strategies, Steps in Sustainability Strategy Formulation, Steps in Sustainable Planning, Unsustainable Take-Make-Waste Business Models, Sustainable Models, Sustainability Self-Assessment by Sectors and Functions.

Unit – IV: Sustainability in Urban Metabolism: Introduction, Sustainable and Circular Value Chain, Systemic Perspective on Value Creation, Emergence and Dynamics of Circular Value Systems, Materials and Methods, Territorial Analysis, Natural Capital, Human Capital, Economic and Manufacture Capital, Social Capital, Cultural Capital, Consequential Lifecycle Assessment.

Unit – V: Market and sustainability: Introduction, Defining Human Needs, Material Services and Characteristics, Integrating Material Services, Sustainability Marketing Mix, Benefits of Sustainability Marketing, Strategy for Sustainability Marketing, Sustainable Consumer Behaviour, Segmentation, Positioning, Competitive Advantage, Sustainability Reporting, Importance of Trust, Sustainability Reporting Guidelines.

Suggested Readings

- Pardeep Singh, Pramit Verma, Daniela Perrotti, K.K.Srivastava, Environmental Sustainability and Economy, Elsevier Science, 1e,2021.
- Rudiger Hahn, Sustainability Management: Concepts, Instruments,and Stakeholders from a Global Perspective, Paper pack edition,2022.
- Hardisty, Paul Environmental and Economic Sustainability Press, Routlege,1e,2019.
- Dr.Deb Prasanna Choudhury, Sustainability Management: Strategies and execution for achieving Responsible Organizational Goals,1e,2018.

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MBA SEMESTER – I

22MBA6D: CROSS CULTURAL MANAGEMENT (OPEN ELECTIVE - I)

Course Objectives:

- To enable understanding of importance of cross culture in conduct of business.
- To elucidate various aspects in reconciling cultural dilemmas, culture and styles of management.
- To explain culture and corporate structures.
- To elucidate on the importance of business communication across cultures.
- To highlight the importance of Working with International teams.

Course Outcomes: Students will be able to

- Understand the importance of the influence of national culture on business culture.
- Learn about value orientations and dimensions.
- Assess culture and leadership, culture and strategy, cultural change in organizations.
- Understand cross cultural team management.
- Learn the aspects of working with international teams and multiple cultures and management of conflicts

Unit – I: Introduction: Determinants of Culture, Facets of Culture, Levels of Culture, National Cultural Dimensions in the Business Context, The Influence of National Culture on Business Culture. Business Cultures: East and West.

Unit – II: Cultural Dimensions and Dilemmas: Value Orientations and Dimensions, Reconciling Cultural Dilemmas, Culture and Styles of Management: Management Tasks and Cultural Values.

Unit – III: Culture and Organizations: Culture and Corporate Structures, Culture and Leadership, Culture and Strategy, Cultural Change in Organizations, Culture and Marketing, Cultural Diversity.

Unit – IV: Culture and Communications: Business Communication across Cultures, Barriers to Intercultural Communication, Negotiating Internationally.

Unit – V: Cross Cultural Team Management: Working with International Teams, Group Processes During International Encounters, Conflicts and Cultural Difference, Understanding and Dealing with Conflicts, Developing Intercultural Relationships.

Suggested Readings:

- Marie-Joelle Browaeys, Roger Price: Understanding Cross-Cultural Management, Pearson, 4e, 2019.
- David C.Thomas: Cross Cultural Management, Sage Publications, 4e, 2017.
- Nigel Holdon, Cross Cultural Management: Knowledge Management Perspective, Pentice Hall, 2012.
- Parissa Haghirian: Multinational and Cross-Cultural Management, Routledge, 2012.
- Richard Mead: International Management-Cross cultural Dimension, 3/e, Blackwell, 2015.
- Jerome Dumetz, Cross-cultural Management Textbook: Lessons from the world leading experts in cross-cultural management, Create Space Independent Publishing Platform; Student edition (September 5, 2012), Oakland, USA.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - I

22MBA07: BUSINESS COMMUNICATION LAB

Course Objectives:

- To demonstrate the importance various modes of communication and their applications in business.
- To develop Business Writing skills with practice of writing letters and improving the readability of written communication.
- To highlight the importance of writing business reports and proposals.
- To impart knowledge and skills necessary for development of verbal (speech & presentation) and non-verbal (body language) skills.
- To orient on the contemporary aspects in communication.

Course Outcomes: Students will be able to

- Appreciate the importance and influence of Business Communication and learn its applications for the purpose of self-development.
- Learn by practice of writing a variety of formal and informal letters & e-mails and reports and improve the readability of written documents
- Identify the intricacies of writing Business Reports and Proposals
- Develop verbal (oral) skills by giving presentations and participating in group discussions; appreciate the impact of body language in the process of communication
- Polish their etiquette, improve telephonic skills and appreciate the need for culture in maintenance of public relations.

Unit – I: Introduction: Introduction to Business Communication, Communication Barriers, Communication Media Choices, Inter-cultural and Team Communication, Interpersonal Communication: Respecting Social Protocol, Networking and Socializing Professionally, Non-Verbal Communication, Listening, Communication through social media, Business Meetings.

Unit – II: Developing Business Writing Skills: Process of Writing, Drafting, Revising Visuals, Editing, Proofreading and Formatting, Writing Positive and Neutral Messages, Persuasive Messages, Bad News Messages, Business Letter Writing, Kinds of Business Letters, Communicating with E-Mail and Memos. Improving Readability of Written Communication using Gunning Fog Index.

Unit – III: Business Reports and Proposals: Writing the Report, Planning the Report, Steps in Writing Business Reports, Parts of a Report, Corporate Report and Business Proposal, Citing Sources.

Unit – IV: Oral and Employment Communication: The Role of Business Presentations, Planning and Organizing Presentations, Team Presentations, Online Presentations. Understanding Yourself, Career, Goal Setting, Preparing Resume, Resume Formats, Writing Covering Letters, and Enquiry Mails, Preparing for the Job Interview.

Unit – V: Contemporary Aspects in Communication: Business Etiquette, Developing Professional Telephone Skills, Mass Media, Public Relations Management, Cross Cultural and Global Communication, Communication in Information Technology, e-Business related Operations.

Suggested Readings:

- Kelly M. Quintanilla and Shawn T. Wahl, Business and Professional Communication, Sage Publications, 4e, 2020.
- Mallika Nawal, Business Communication, Cengage Learning, 2e, 2020.
- Varinder Kumar, Bodh Raj, Business Communication, Kalyani Publishers,6e,2019.
- Ober Newman, Communicating in Business, Cengage Learning, 2015.
- Rebecca Moore Howaward, Writing Matters, 3e, Mc Graw Hill Education, 2018.
- Jeff Butterfield, Soft Skills for Everyone, Cengage Learning, 2017.
- Rajendra Pal, J S Korlahahi, Essentials of Business Communication, Sultan Chand & Sons, New Delhi, 2013.
- Elevate English, Mc Graw Hill, www.ellevateenglish.com.

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MBA SEMESTER - I

22MBA08: STATISTICAL DATA ANALYSIS LAB

Course Objectives:

- To highlight the importance of application of Statistical tools to Research Problem / Projects.
- To enable the practice of MS- EXCEL / SPSS.
- To demonstrate the management and analysis of data using graphs, tables, worksheets, pivot tables etc.
- To educate students on the significance of data from external Sources.
- To highlight the importance of statistical analysis for better decision making.

Course Outcomes: Students will be able to

- Understand the importance of the main functions of MS- Excel /SPSS.
- Practice advance Excel Tools for conduction of Data Analysis
- Evaluate Data Analysis using Pivot Tables and Pivot Charts.
- Analyze the Data using Descriptive Statistics
- Conduct various Parametric and Non-parametric Tests using MS Excel / SPSS

.

Unit – I: Introduction to Statistical Packages: MS – EXCEL or SPSS: Introduction, Uses, Functions and Features of Statistical Packages, Getting started with Excel/SPSS, Highlights and Main Functions: Home, Insert, Page Layout, Formulae, Data, Review, View, Add-inns, Using Help Function, Customizing the Quick Access Toolbar.

Unit – II: Creating and Using Templates: Working with Data: Entering, Editing, Copy, Cut, Paste, Paste Special, Formatting Data and Using the Right Mouse Click, Saving, Page Setup, and Printing, Using Headers and Footers, Manipulating Data, Using Data Names and Ranges, Filters and Sort and Validation Lists.

Unit – III: Data from External Sources: Using and Formatting Tables, Basic Formulae and Use of Functions, Data Analysis Using Charts and Graphs, Managing, Inserting, and Copying Worksheets, Securing the Document, Advanced Formulae and Functions, Worksheet Features, Data Analysis using Pivot Tables and Pivot Charts.

Unit – IV: Data Analysis – I: Tabulation, Bar Diagram, Multiple Bar Diagram, Pie Diagram, Measures of Central Tendency: Mean, Median, Mode. Measures of Dispersion: Variance, Standard Deviation, Coefficient of Variation. Correlation and Regression Lines.

Unit – V: Data Analysis – II: t-test, F-test, ANOVA One-way classification, Chi-square Test, Independence of attributes.
Time series: Forecasting Method of Least Squares, Moving Average Method. Inference and Discussion of Results.

Suggested Readings:

- R. Panneerselvam, Business Statistics Using MS Excel, Sage Publications, 2022.
- Glyn Davis, Branko Pecar, Business Statistics Using Excel, Oxford University Press, 2e, 2014.
- D P Apte: Statistical Tools for Managers USING MS EXCEL, Excel, 2012.
- David M Levine, David. F. Stephan & Kathryn A. Szabat, Statistics for Managers – Using MS Excel, PHI, 2015.
- Bruce Bowerman, Business Statistics in Practice, TMH, 5e, 2012.
- Ajai.S. Gaur, Sanjaya S. Gaur, Statistical Methods For Practice and Research, Response, 2009.

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MBA SEMESTER - II

22MBA09: HUMAN RESOURCE MANAGEMENT

Course Objectives:

- To educate on the concepts, significance and role of Human Resource Management in an Organization.
- To impart knowledge on the aspects of Talent Management, Manpower Planning, Recruitment and selection.
- To educate on the processes of Training & Development and Performance Management & Appraisals.
- To highlight the significance of effective Compensation, Rewards and Employee Welfare Practices in Organizations along with the relevant Acts.
- To elucidate on the aspects of employee relations and stress management along with the relevant Acts.

Course Outcomes: Students will be able to

- Understand the concepts, role and functions of HRM and appreciate the need of HR to act as a Strategic Business Partner of the Organization.
- Learn the methods of conducting Job Analysis, process of writing Job Descriptions & Specifications and the processes of recruitment and selection.
- Gain an understanding of various concepts and practices of Employee Training & Development and Performance Management & Appraisals.
- Learn the principles and practices of Employee Compensation and Rewards, with the help of Job Evaluation & Broad-banding etc. and the salient features of Workmen Compensation Act and Minimum Wages Act.
- Appreciate the need for effective Employee Relations and learn the salient features of Industrial Disputes Act and Factories Act.

Unit – I: Introduction of HRM: Introduction to HRM, Line Managers, HR Role and Responsibilities, New Approaches to Organizing HR, Globalization & Competition Trends, Technological Trends, Trends in Nature of Work, Workforce and Demographic Trends, Economic Challenges, High Performance Work System's, Equal Employment Opportunity, HR Score Card. Human Resource Information System (HRIS), e-HRM, HR Analytics: An Introduction.

Unit – II: Recruitment and Selection: Basics of Talent Management Process, Job Analysis, Methods for Collecting Job Analysis Information, Job Descriptions and Specifications, Job Satisfaction, Job Enlargement, Job Enrichment and Job Rotation, HR Planning, Recruitment, e-Recruitment & Selection Process, Planning & Forecasting of human Resources, Sources of Recruitment, Recruitment on Diverse Work Force, Employee Testing and Selection, Basic Types of Interviews, Errors in Interviews.

Unit – III: Training and Development and Performance Management: Importance of Training and Development, Training Process, Analyzing Training Needs & Designing the Program, Implementation of training programs, Training Methods, Management Development Process, Evaluation of Training and Development programs.
Performance Management: Concept of Performance Management and Appraisal, The Performance Appraisal Process, Techniques for Performance Appraisal, Career Management.

Unit – IV: Compensation and Employee Welfare: Basic Factors in Determining Pay Rates, Job Evaluation Methods, Compensation and Reward Structure, Pricing Managerial and Professional Jobs, Performance based Pay Benefits: Insurance, Retirement Benefits, Employee Welfare Facilities. Salient Features of Workmen Compensation Act & Minimum Wages Act.

Unit – V: Employee Relations: Labor Movement, Collective Bargaining Process, Grievances: Grievances Handling Procedure, Employee Separation, Employee Safety and Health, Occupational Safety Law, Work Place Health Hazards Problems, Remedies and Work-Life Integration, Stress Management: Salient Features of Industrial Disputes Acts 1947, Factories Act. **Prevention of Sexual Harassment** (PoSH) and Migrant Labor Act.

Suggested Readings:

- P. Subba Rao, Essentials of Human Resource Management, Himalaya Publishing, 6e, 2021.
- Biswajeet Pattanayak, Human Resource Management, 5e, 2018.
- Gary Dessler, Biju Varkkey, Human Resource Management, Pearson, 4e, 2017.

- Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learning 2016.
- Biswajeet Pattanayak, Human Resource Management, 5e, 2018.
- K. Aswathappa, Human Resource Management: Text and Cases, TMH,8e, 2017.
- Sharon Pande and Swapnalekha Basak, Human Resource Management, Text and Cases, Vikas Publishing, 2e, 2016.

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MBA SEMESTER - II

22MBA10: MARKETING MANAGEMENT

Course Objectives:

- To enable understanding of the basic concepts and applications of Marketing and Marketing Research.
- To educate on the aspects of analyzing Market Opportunities and Customer Value and Marketing Mix.
- To elucidate on designing a customer driven strategy through Marketing Segmentation, Targeting and Positioning.
- To clarify the significance of Distribution decisions, Promotion & Communication strategies.
- To highlight the importance of pricing decisions & personal communication.

Course Outcomes: Students will be able to

- Understand the important concepts and principles of Marketing Management and Marketing Research.
- Learn about the analysis of Market Opportunities and Customer Value with the help of Marketing Mix Elements.
- Learn the significance of designing a customer driven strategy through Marketing Segmentation, Targeting and Positioning.
- Assess Global marketing, green marketing strategies for sustainable development.
- Gain insights of the key aspects of pricing decisions and the role of communication

Unit – I: Introduction to Marketing: Importance and Scope of Marketing, Core Marketing Concepts, Market Place, Marketing in Practice, Marketing Environment, Marketing Strategies and Plans, The New Marketing Realities, Marketing Analytics: An Introduction.
Market Research, Marketing Research Process, Marketing Information Systems. Marketing Research and Ethics, International Marketing Research.

Unit – II Analyzing Marketing Opportunities, Customer Value and Marketing Mix: Consumer Decision-making, Building Customer Value, Analyzing Consumer Markets, Consumer Behavior, Cultural, Social & Personal Factors, Developing Products & Brands, Product Levels; Classifying Products, Product Range, Product Line & Product Mix, Product Life Cycles, New Product Development, New Service Development, Stages of Product/ Service innovation development, The Process of Adoption, Branding.

Unit – III: Designing a Customer Driven Strategy: Market Segmentation, Targeting, Positioning Process, Segmentation of Consumer Market, Business Market, Requirement for Effective Segmentation, Market Targeting, Evaluating Market Segmentation, Selecting Target Market Segmentation, Positioning and Repositioning, Positioning Maps, Product Positioning Strategies.

Unit – IV: Distribution Decisions, Promotion & Communication Strategies: Marketing Channels, Channel Intermediates and Functions, Channel Structure, Channel for Consumer Products, Business and Industrial Products, Alternative Channel, Channel Strategy Decisions. The Promotional Mix, Advertising, Public Relations, Sales Promotion, Personal Selling, Direct and Online Marketing. Marketing Communication: Communication Process, Communication Promotion Mix, Factors Affecting the Promotion Mix.

Unit – V: Pricing Decisions & Personal Communication: Importance of Price, Cost Determinant of Price, Markup Pricing, Profit Maximization Pricing, Break-even Pricing, Pricing Strategies, Ethics of Pricing Strategy, Product Line Pricing, Word of Mouth, Rural Marketing, Bottom of the Pyramid, Relationship Marketing, Retail Marketing, Digital marketing, social media and Mobile Marketing, Host Marketing, MarketSustainability and Ethics, Global marketing, Green Marketing.

Suggested Readings:

- Rosalind Masterson, Nichola Phillips, David Pickton, Marketing: An Introduction, Sage Publications, 5e, 2021.
- G.Shainesh Philip Kotler, Kevin lane Keller, Alexander Chernev, Jagdish N. Sheth, Marketing Management, Pearson, 16e, 2022.
- Philip Kotler, Gray Armstrong, Prafulla Agnihotri, Principles of Marketing, 18e, Pearson Education, 2020.
- Ramaswamy, Nama Kumari, Marketing Management, Sage Publications, 6e, 2018.

- Lamb, Hair, Sharma, Mc Daniel, Principles of Marketing, A South Asian Perspective Cengage Learning, 2016.
- Arun Kumar & N. Meenakshi, Marketing Management, Vikas Publications, 3e, 2016.

NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

MBA SEMESTER - II

22MBA11: FINANCIAL MANAGEMENT

***The students need Discounting Table and Annuity tables for the examination.**

Course Objectives:

- To provide an understanding of basic decisions taken by a Finance Manager in a corporate and help the manager to understand the use of resources efficiently, effectively and economically.
- To explain the various aspects in Investment Decision.
- To learn about Capital structure and its theories.
- To educate students on the significance of dividends and valuation of the firm.
- To elucidate the importance of working capital management, management of current assets.

Course Outcomes: Students will be able to:

- Understand the concept of time value of money.
- Learn about the capital budgeting techniques and cost of capital.
- Learn the significance of Capital structure vs. financial structure.
- Assess dividend policies of Indian companies, determinants of working capital, analysis of investment in inventory.
- Understand the Concepts and Applications of Working Capital Management and Management of Current Assets.

Unit – I: The Finance Function: Nature and Scope, Evolution of Finance Function, Its New Role in the Contemporary Scenario, Goals of Finance Function, Profit Maximization and Wealth Maximization, the Agency Relationship and Costs; Risk-Return Trade off; Concept of Time Value of Money, Future Value and Present Value and the Basic Valuation Model.

Unit – II: The Investment Decision: Investment Decision Process, Project Generation, Project Evaluation, Project Selection and Project Implementation. Developing Cash Flow, Data for New Projects, Capital Budgeting Techniques: Traditional and DCF Methods. The NPV vs. IRR Debate, Approaches for Reconciliation. Capital Budgeting Decision under Conditions of Risk and Uncertainty. Cost Of Capital: Concept and Measurement of Cost of Capital, Weighted Average Cost of Capital and Marginal Cost of Capital. Importance of Cost of Capital in Capital Budgeting Decisions.

Unit – III: Capital Structure and Dividend Decisions: Capital Structure vs. Financial Structure, Capitalization, Financial Leverage, Operating Leverage and Composite Leverage. EBIT-EPS Analysis, Indifference Point/Break-even Analysis of Financial Leverage, Capital Structure Theories: The Modigliani Miller Theory, NI, NOI Theory and Traditional Theory.

Unit – IV: Dividend Decisions: Dividends and Value of the Firm, Relevance of Dividends, the MM Hypothesis, Factors Determining Dividend Policy, Dividends and Valuation of the Firm, the Basic Models, Forms of Dividend. Declaration and Payment of Dividends. Bonus Shares, Rights Issue, Share-splits, Major Forms of Dividends, Cash and Bonus Shares. Dividends and Valuation. Major Theories centered on the works of Gordon, Walter and Lintner, Dividend Policies of Indian companies.

Unit – V: (a) Working Capital Management and Finance: Working Capital Management: Components of Working Capital, Gross vs. Net Working capital, Determinants of Working Capital Needs, the Operating Cycle Approach. Financing of Working Capital through Bank Finance and Trade Credit.**(b) Management of Current Assets**: Basic Strategies for Cash Management, Cash Planning, Cash Budget, Cash Management Techniques/Processes. Marketable Securities: Characteristics, Selection Criterion, Management of Receivables, Credit Policy, Credit Evaluation of Individual Accounts, Monitoring Receivables. (c) Management of Inventory, Inventory Management Process, Inventory Control Systems, Analysis of Investment in Inventory.

Suggested Readings:

- Prasanna Chandra, Financial Management, 10e, Mc Graw Hill, 2019.
- M.Y Khan, P K Jain, Financial Management-Text and Problems, Mc Graw Hill, 8e, 2019.
- I M Pandey, Financial Management, Vikas Publications, 11e, 2015.
- James Cvan Horne, Sanjay Dhamija, Financial Management and Policy, Pearson Education, New Delhi,12e,2011.
- Eugene F. Brigham Michael C. Ehrhardt, Financial Management, Cengage Learning, 12e, 2012.
- Arindam Banerjee, Financial Management, Oxford Publications, 2016.

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MBA SEMESTER - II

22MBA12: QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

Course Objectives:

- To impart knowledge of basic tools of Operations research in solving the management problems using mathematical approaches for decision making.
- To teach the methods of solving Linear Programming Problems.
- To impart knowledge on assignment model and transportation problem.
- To impart knowledge on the significance of decision tree and Network analysis.
- To highlight the importance of Queuing Theory.

Course Outcomes: Students will be able to:

- Understand the origin and application of operations research.
- Learn about the Formulation of Linear Programming Problem for different areas.
- appreciate the significance of variations of assignment problem, methods for finding Initial feasible solution.
- Learn the aspects of Decision Theory and Network Analysis
- Gain insights of the theoretical principles and practical applications of different queuing models.

Unit – I: Introduction to Operations Research: Nature and Scope of Operations Research: Origins of OR, Applications of OR in different Managerial Areas, Problem Solving and Decision-making, Quantitative and Qualitative Analysis. Defining a Model, Types of Models, Process for Developing an Operations Research Model, Practices, Opportunities and Shortcomings of using an OR Model.

Unit – II: Linear Programming Method: Structure of LPP, Assumptions of LPP, Application Areas of LPP, Guidelines for Formulation of LPP, Formulation of LPP for Different Areas**,** Solving of LPP by Graphical Method: Extreme Point Method, Simplex Method, Converting Primal LPP to Dual LPP, Limitations of LPP.

Unit – III: Assignment Model: Algorithm for Solving Assignment Model, Hungarians Method for Solving Assignment Problem, Variations of Assignment Problem: Multiple Optimal Solutions, Maximization Case in Assignment Problem, Unbalanced Assignment Problem, Travelling Salesman Problem, Simplex Method for Solving Assignment Problem.
Transportation Problem: Mathematical Model of Transportation Problem, Methods for Finding Initial Feasible Solution: Northwest Corner Method, Least Cost Method, Vogels Approximation Method, Test of Optimality by Modi Method, Unbalanced Supply and Demand, Degeneracy and its Resolution.

Unit – IV: Decision Theory: Introduction, Ingredients of Decision Problems. Decision-making under Uncertainty, Cost of Uncertainty Under Risk, Under Perfect Information, Decision Tree, Construction of Decision Tree.
Network Analysis: Network Diagram, PERT, CPM, Critical Path Determination, Project Completion Time, Project Crashing.

Unit – V: Queuing Theory: Queuing Structure and Basic Component of a Queuing Model, Distributions in Queuing Model, Different Queuing Models with FCFS, Queue Discipline, Single and Multiple Service Station with Finite and Infinite Population. Game Theory, Suddle Point, Value of the Game.

Suggested Readings:

- Mik Wisniewski, Dr Farhad Shafti, Quantiative Analysis for Decision Makers, Pearson,7e,2019.
- Miguel Ángel Canela, Inés Alegre, Alberto Ibarra ,Quantiative Methods for Management: A Practical Approach, Springer International Publishing,1e,2019.
- James E. Sallis, Geir Gripsrud, Ulf Henning Olsson, Ragnhild Silkoset ,Research Methods and Data Analysis for Business Decisions: A Primer Using SPSS,Springer International Publising,1e,2021.
- R. Pannerselvam, Operations Research, Prentice Hall International, 3e, 2015.
- N.V.S.Raju,Operations Research:Theory and Practice,CRC Press,2020.
- R. Pannerselvam, Operations Research, Prentice Hall International, 3e, 2015
- J.K. Sharma, Operations Research: Theory Dand applications, Macmillian,5e, 2013.

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MBA SEMESTER - II

22MBA13: ENTREPRENEURSHIP AND DESIGN THINKING

Course Objectives:

- To understand the Entrepreneurial process and also inspire them to be Entrepreneurs.
- To highlight importance of entrepreneurial motivational behavior, entrepreneurial competencies, entrepreneurial Stress.
- To elucidate on the opportunities and challenges of entrepreneurship
- To clarify students the significance of Principles, process of Design Thinking.
- To educate on Development of Prototypes, Testing Ideas and Implementing Design Thinking.

Course Outcomes: Students will be able to:

- Understand the approaches to entrepreneurship.
- Learn about the individual entrepreneurial mind-set and Personality.
- Learn the significance of Feasibility Analysis, Industry, competitor analysis, new venture development.
- Understand the principles of implementation of Design Thinking.
- Appreciate the relevance of Creativity in the process of implementation of Design Thinking

Unit – I: Understanding Entrepreneurial Mindset: The Evolution of Entrepreneurship, Qualities, Skills, Functions of Entrepreneurs, Types of Entrepreneurs, Approaches to Entrepreneurship, Process Approach, Role of Entrepreneurship in Economic Development.
The individual Entrepreneurial Mindset and Personality: The Entrepreneurial Journey, Stress and the Entrepreneur, The Entrepreneurial Ego, Entrepreneurial Motivations, Motivational Cycle, Entrepreneurial Motivational Behavior, Entrepreneurial Competencies, Entrepreneurial Stress.

Unit – II: Strategic Perspectives in Entrepreneurship: Strategic Planning, Strategic Actions, Strategic Positioning, Business Stabilization, Building the Adaptive Firms, Understanding the Growth Stage, Internal Growth Strategies and External Growth Strategies, Unique Managerial Concern of Growing Ventures.

Unit – III: Opportunities and Challenges of Entrepreneurship: Initiatives by the Government of India to Promote Entrepreneurship, Social and Women Entrepreneurship. Feasibility Analysis, Industry and Competitor Analysis, Formulation of the Entrepreneurial Plan, The Challenges of New Venture Start-ups, Developing an Effective Business Model, Blue and Red Ocean Strategies, Sources of Finance, Critical Factors for New venture Development, Evaluation Process. Intellectual Property Protection: Patents, Copyrights, Trademarks and Trade Secrets, Avoiding Trademark Pitfalls.

Unit – IV: Design Thinking – An Introduction: Principles of Design Thinking, Process of Design Thinking, planning a Design Thinking Project, Understanding of the Problem, Problem Analysis, Reformation of the Problem, Empathetic Design Methods.

Unit – V: Prototype, Testing Ideas, Implementing Design Thinking: Creativity, Creativity Process, Creativity Techniques, Business Idea, Evaluation of Ideas, Kano Method, Finding Gaps in the Market Place, Prototype, Lean Startup Method, Visualization, Presentation Techniques, Desirability Testing, Methods to Initiate Ventures, Creating New Ventures, Acquiring an Established Venture, Franchising, Advantages and Disadvantages, Implementing Design Thinking, Agility for Design Thinking.

Suggested Readings:

- Devayani M. Lal, Design Thinking, Sage Publications, 1e, 2021.
- Ali J Ahmed, Punita Bhatt, Lain Acton, Entrepreneurship in Developing and Emerging Economies, Sage Publications, 1e, 2019.
- Christian Mueller- Roterberg, Handbook of Design Thinking –Tips and Tools for how to design Thinking, Independently Published, US, 2018.
- Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship, Mc Graw Hill, 10e,2018.
- Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching new ventures, 4e, Pearson, 2015.
- D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, Cengage Learning,1e, 2012.

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MBA SEMESTER - II

22MBA14: LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Course Objectives:

- To provide understanding of the components and processes of supply chain and logistics management as well as the performance drivers of supply chain.
- To impart knowledge on the various functions of logistics management.
- To educate on designing of the supply chain network.
- To clarify the significance of establishing global supply chain.
- To highlight the role of information technology in supply chain.

Course Outcomes: Students will be able to:

- Understand the cyclical perspective of logistics and supply chain process.
- Learn about the distribution, transportation, warehousing related issues and challenges in supply chain.
- Appreciate the significance of network design in the supply chain.
- Gain knowledge of various models / tools of measuring the Supply Chain Performance.
- Appreciate the role of coordination and technology in supply chain management.

Unit – I: Understanding Supply Chain: Objectives of a Supply Chain, Importance, Stages of Supply Chain, Value Chain Process, Cycle View of Supply Chain Process, Key Issues in SCM, Logistics & SCM, Supply Chain Drivers and Obstacles, Supply Chain Strategies, Strategic Fit, Best Practices in SCM, Obstacles of Streamlined SCM, Green Supply Chain Management, Supply Chain Sustainability.

Unit – II: Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Difference between Logistics and Supply Chain, Distribution related Issues and Challenges. Gaining Competitive Advantage through Logistics Management, Transportation: Functions, Costs, and Mode of Transportation Network and Decision, Models, Containerization, Cross Docking, Reverse Logistics. Outsourcing: Nature and Concept, Strategic Decision to Outsourcing, Third-party Logistics (3PL), Fourth-party Logistics (4PL).

Unit – III: Designing the Supply Chain Network: Designing the Distribution Network, Role of Distribution, Factors Influencing Distribution, Design Options, e-Business and its Impact, Distribution Networks in Practice, Network Design in the Supply Chain, Role of Network, Factors Affecting the Network Design Decisions, Modeling for Supply Chain.

Unit – IV: Supply Chain Performance: Bullwhip Effect and Reduction, Performance Measurement: Dimension, Tools of Performance Measurement, SCOR Model. Demand Chain Management, Global Supply Chain, Challenges in Establishing Global Supply Chain, Factors that influence Designing Global Supply Chain Network.

Unit – V: Coordination in a Supply Chain: Importance of Coordination, Lack of Supply Chain Coordination and the Bullwhip Effect, Obstacles to Coordination, Managerial Levels, Building Partnerships and Trust, Continuous Replenishment and Vendor Managed Inventories, Collaborative Planning, Forecasting and Replenishment. Role of Information Technology in Supply Chain, Supply Chain 4.0.

Suggested Readings:

- IMT Ghaziabad, Advanced Supply Chain Management, Sage Publications, 2021.
- Rajat K. Basiya, Integrated Supply Chain Management, Sage Publications, 2020.
- K Sridhara Bhat, Logistics & Supply Chain Management, HPH,1e,2017.
- Chopra, Sunil, Meindl, Peter and Kalra, D. V., Supply Chain Management: Strategy, Planningand Operation; Pearson Education, 6e, 2016.
- Altekar, Rahul V, Supply Chain Management: Concepts and Cases; PHI Learning ,1e,2005.
- Ballou, R.H. Business Logistics Management. Pearson Education, 5e,2014.
- Coyle, Bardi, Langley, The Management of Business Logistics – A Supply Chain Perspective, Thomson Press, 7e,2003.

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MBA SEMESTER – II

22MBA15A: TOTAL QUALITY MANAGEMENT (OPEN ELECTIVE-II)

Course Objectives:

- To provide understanding of the basic concepts Quality concept, principles, various tools, statistical process control for the implementation of quality management with ISO certification process and its need for the industries.
- To explain to students to why TQM principles are important.
- To impart knowledge of different tools and techniques of TQM.
- To elaborate on various aspects in Quality Management Systems.
- To educate on the models of TQM implementation in manufacturing and service sectors.

Course Outcomes: Students will be able to:

- Understand the need for Quality.
- Learn the relevant TQM models like PDCA Cycle, 5S, Kaizen, Quality Circles.
- Learn statistical aspects relevant for process control.
- Assess the relevance of Total Productive Maintenance, FMEA, Six Sigma.
- Learn different Quality Management Systems.

Unit – I: Introduction: Evolution of Quality, Quality Definition, Need for Quality, Dimensions of Product and Service Quality, Basic Concepts of TQM, TQM Framework, Quality Philosophies, Contributions of Deming, Juran and Crosby, Feiganbaum, Ishikawa and Taguchi, Barriers to TQM, Quality Statements, Customer Focus, Customer Orientation, Customer satisfaction, Customer Complaints, Customer Retention, Costs of Quality.

Unit – II: TQM Principles: Leadership, Strategic Quality Planning, Quality Councils, Employee Involvement, Motivation, Empowerment, Team and Teamwork, Quality Circles Recognition and Reward, Performance Appraisal, Continuous Process Improvement, PDCA Cycle, 5S, Kaizen, Supplier Partnership, Partnering, Supplier Selection, Supplier Rating.

Unit – III: Statistical Process Control: Statistical Fundamentals such as Mean and Standard Deviation, Chance and Assignable Causes, Control Charts for Variables, Process Capability Analysis such as Cp and Cpk, Seven basic (Traditional) Quality Control Tools: 1) Check Sheets (Tally Sheet) 2) Stratification (Alternatively, Flowchart or Run-chart) (Trend Analysis) 3) Histograms 4) Pareto Chart (80-20 Rule) 5) Cause-and-Effect Diagrams (Fishbone or Ishikawa Diagram) 6) Scatter Diagrams 7) Control charts.

Unit – IV: Tools and Techniques: Quality Functions Development (QFD), Benefits, Voice of Customer, Information Organization, House of Quality (HOQ), Building a HOQ, QFD Process, Taguchi Method and Quality Loss function, Failure Mode Effect Analysis (FMEA): Requirements of Reliability, Failure rate, Total Productive Maintenance (TPM), Seven New Management Tools for Process Improvement: Affinity diagram, Interrelationship Diagram, Tree Diagram, Matrix Diagram**,** Matrix Data Analysis, Arrow Diagram**,** Process Decision program Chart, Benchmarking and POKA YOKE, Six Sigma, Methodologies: DMAIC, DFSS, Six Sigma Belts, Quality Circles.

Unit – V: Quality Management Systems: Introduction, Benefits of ISO Registration, ISO 9000 Series of Standards, ISO 9001, Requirements, Implementation, Documentation, Writing the Documents, Quality Auditing, TQM Culture, Quality Auditing, QS 9000, ISO 14000, Concepts, Requirements and Benefits, TQM Implementation in Manufacturing and Service Sectors.

Suggested Readings:

- Sunil Sharma, Total Quality Management, Sage Publications, 1e, 2018.
- Bester filed, et al., Total Quality Management, Pearson Education Asia, 3e , 2006.
- Suganthi, L. and Samuel, A., Total Quality Management, Prentice Hall (India) Pvt. Ltd., 2006.
- Janakiraman. B and Gopal.R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
- James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
- Oakland, J.S., TQM – Text with Cases, Butterworth – Heinemann Ltd., Oxford, 3rd Edition,2006.

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MBA SEMESTER - II

22MBA15B: MARKETING RESEARCH (OPEN ELECTIVE-II)

Course Objectives:

- To provide conceptual understanding of marketing research, its design, and application of research methodology to Marketing issues.
- To explain to students the need for creating proper marketing research proposal.
- To impart knowledge on sampling and acquire knowledge on probability and non- probability sampling techniques.
- To impart knowledge on the concepts of measurement and scaling.
- To highlight the role of marketing research methodology in different business contexts.

Course Outcomes: Students will be able to:

- Understand the importance of marketing research.
- Learn various aspects in research design.
- Learn sampling design process.
- Understand the characteristics of a good measurement, scaling and sampling methodology.
- Learn hypothesis testing and data presentation.

Unit – I: Introduction to Marketing Research: Meaning and Scope of Marketing Research, Factors that Influence Marketing Research, Scope of Marketing Research, Limitations of Marketing Research, Marketing Research Process, Role of Marketing Research in Marketing Decision-making, International Marketing Research, Marketing Research in social media, Mobile Marketing Research, Ethics in Marketing Research, Use of Information Technology in Marketing Research.

Unit – II: Marketing Research Design: The Process of Defining the Problem and Developing an Approach, Defining a Marketing Research Problem, Exploratory, Descriptive, Casual Research Design, Marketing Research Proposal.

Unit – III: Sampling and Data Collection: Sampling Design Process, Classification of Sampling Techniques, Probability and Non-Probability Sampling Techniques, Internet Sampling, Sampling Distribution, Sample Size Determination, Non-Response Issues in Sampling.
Sources of Data Collection, Methods of Data Collection.

Unit – IV: Measurement and Scaling: Concept of Measurement, Types of Measurement Scales: Likert, Semantic Differential, Guttman, Interval, Q-Sort, Nature of Measurement, Characteristics of a Good Measurement, Nature of Attitude Scale, Rating Scale, Ranking Scale, Questionnaire Design, Editing, Coding and Tabulation of data.

Unit – V: Analysis and Presentation of Data: Data Preparation, Data Preparation Process, Statistically Adjusting Data, Frequency Distribution, Cross Tabulation, Hypothesis Testing, Bi-Variate Analysis, Correlation, Regression, Multi-Variate Analysis, Discriminant, Logit Analysis, Factor Analysis, Cluster Analysis.
Report Writing, Report Preparation and Presentation.

Suggested Readings:

- Naresh Malhotra, Satyabhushan Dash, Marketing Research, Pearson,7e, 2019.
- GC Beri, Marketing Research, 4e, 2018, Mc Graw Hill 2018.
- Donald R Cooper, Pamela S Schindler, Marketing Research Concepts and Cases, Mc Graw Hill, 2005.
- David J Luck, Ronald S Rubin, Marketing Research, 9e, PHI, 2006.
- David A Aaker, V. Kumar, Georges, Marketing Research, 9e, Wiley India Pvt Ltd, 2009.
- Donald S. Tull, Del I. Hawkins, Marketing Research –Measurement & Method, PHI Private Limited, 2009.

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MBA SEMESTER - II

22MBA15C: INTERNATIONAL BUSINESS (OPEN ELECTIVE - II)

Course Objectives:

- To highlight the need and importance of studying International Business and provide understanding of the concepts associated with International Business
- To impart knowledge of Classical and Modern International Trade Theories.
- To educate on the aspects of Business, Economic and Regional Integration and Multilateral Trade Agreements
- To elucidate on the elements of Strategy & Structure in International Business
- To highlight the role played by various Functional Areas of Business in International Business Operations

Course Outcomes: Students will be able to:

- Understand the Concepts, Principles and Approaches of International Business.
- Learn the evolution of International Trade thought process with the help of classical and modern theories of International Trade.
- Gain insights of the aspects of Business and Economic Integration with the help of various Regional Economic Integrations and Multilateral Trade Agreements.
- Understand the Strategy and Structure of International Business with the help of Value Chain Analysis, Environmental Scanning, Strategic Alliances.
- Gain knowledge of the contribution of major functional areas of business viz. Production, Finance, Marketing and HRM in International Business Operations.

Unit – I: Introduction to International Business: Need for International Business, Drivers of Globalization, Distinction between Domestic and International Business, International Business Approaches, Modes of International Business, Impediments in International Business, Opportunities and Challenges of International Business, Ease of Doing Business (World Bank), Multi National Corporation (MNCs), International Business Environment: Cultural, Political, Social and Technological Environment.

Unit – II: International Trade Theories: Classical Theories: Mercantilism, Absolute Advantage Theory, Comparative Advantage Theory and Factor Endowment Theory. Modern Theories: Country Similarity Theory, Product Life Cycle Theory, New Trade Cycle Theory and National Competitive Advantage Theory. India's Foreign Trade, Foreign Direct Investment in India, Balance of Payments.

Unit – III: International Business and Economic Integration: Levels of Economic Integration, Benefits and Challenges of Economic Integration, Free Trade Agreement (FTA), The Customs Union, The Common Market, The Economic Union. Arguments Surrounding Economic Integration, Regional Economic Groups: European Union, NAFTA, ASEAN, SAARC, QUAD and G8. Multilateral Trade Agreements: GAAT, WTO, TRIPS and TRIMS, UNCTAD. International Trade Policy of India.

Unit – IV: Strategy and Structure of International Business: Environmental Analysis, Value Chain Analysis, Types of Strategies, Strategy Implementation Process, Control and Evaluation, Strategic Alliances, Nature, Benefits, Pitfalls of Strategic Alliances, Scope of Strategic Alliance, Alliance Development Process, Economic Considerations for Strategic Alliances. Choosing an Organizational Design Structure, Issues in Global Organizational Design.

Unit – V: International Business Operations: Issues involving International Production: Sourcing and Vertical Integration. Major Activities in International Marketing: Brand Decisions. Issues of International Financial management: Forex Market, International Monetary System, International Financial Markets, Export Financing. Managing International HR Activities: HR Planning, Recruitment and selection, Expatriate Selection and Training. Cross Cultural Issues in International Business.

Suggested Readings:

- Charles W. L Hill, G. Thomas M Hult, Rohit Mehtani, International Business, Mc Graw Hill,11e, 2019.
- Ehud Menipaz, Amit Menipaz and Shiv S Tripathi, International Business – Theory and Practice, Sage Publishers, 1e, 2017.
- Michael R. Czinkota, Ilkka A. Ronkainen, Michael H. Moffett, International Business, Wiley,8e, 2011.
- K Ashwatappa, International Business, Mc Graw Hill, 6e,2015.

- Sanjay Misra, P.K. Yadav, International Business: Text & Cases, PHI,2009.
- Rakesh Mohanh Joshi, International Business, Oxford University Press, 2009.
- Subba Rao,International Business, Himalaya Publications,2007.

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MBA SEMESTER - II

22MBA015D: RURAL MARKETING (OPEN ELECTIVE – II)

Course Objectives:

- To enable understanding of the importance of Rural Marketing, Rural Environment, Problems in Rural Marketing in India
- To describe the different rural marketing Strategies to be adopted by the corporate.
- To elaborate on the rural market brand and channel management aspects.
- To help understand the factors that influence rural consumers during purchase of products
- To impart knowledge on various applications and innovation strategies in rural marketing.

Course Outcomes: Students will be able to:

- Understand the importance of Indian Rural Economy.
- Learn various rural marketing strategies
- Learn challenges of Retail Channel Management.
- Understand the aspects of rural business research.
- Learn e- rural marketing, CSR, IT for rural development, e- Governance for Rural India.

Unit – I: Introduction: Nature and Characteristics of Rural Market, Understanding the Indian Rural Economy, Rural Marketing Models, Rural Marketing Vs Urban Marketing, Parameters Differentiating Urban & Rural Market, Differences in Consumer Behavior in Rural and Urban Markets.

Unit – II: Rural Marketing Mix: Rural Marketing Mix, Additional Ps in Rural Marketing, 4As of Rural Marketing Mix, New Product Development for Rural Market, Rural Market Product Life Cycle, Objectives behind New Product Launch, New Product Development process.

Unit – III: Rural Market Brand & Channel Management: Brand Loyalty in Rural Market, Regional Brands Vs National Brands, Channel Management, Indian Rural Retail Market, Rural Retail Channel Management, Strategies of Rural Retail Channel Management.

Unit – IV: Rural Market Research: Sources of Information, Factors Influencing Rural Consumers during Purchase of Products, Rural Consumer Life style, Approaches and Tools of Marketing Research, Rural Business Research, Evolution of Rural Marketing Research, Sources and Methods of Data Collection, Data Collection Approaches in Rural Areas, Data Collection Tools for Rural Market. Limitation and Challenges in Rural Marketing Research, Role of Rural Marketing Consulting Agencies.

Unit – V: Applications and Innovations: Marketing of Consumer Products, Services, Social Marketing, Agricultural Marketing, Rural Industry Products, Innovation for Rural Market, Marketing Strategies, e-Rural Marketing, Agricultural Co–operative Marketing, Rural Market Mapping, Corporate Social Responsibility, Organized Rural Marketing, IT for Rural Development, e-Governance for Rural India.

Suggested Readings:

- Dinesh Kumar, Punam Gupta, Rural Marketing, Sage Publications, 2017.
- Pradeep Kashyap, Rural Marketing, 3e Pearson Education, 2016.
- T P Gopalaswamy, Rural Marketing, Environment, problems and strategies,Vikas Publications, 3e,2016.
- Sanal Kumar Velayudhan, Rural Marketing, Sage Publications,2e, 2012.
- C. S. G. Krishnamacharyulu, Lalitha Ramakrishnan, Rural Marketing: Text and Cases, Pearson
- Education, 2009.
- Balram Dogra & Karminder Ghuman, Rural Marketing, TMH, 2009.

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MBA SEMESTER - II

22MBA22: SUMMER INTERNSHIP

Course Objectives: To acquire practical knowledge by working in any organization. Students should learn application of conceptual learning to practical business problems and also develop interpersonal relations, working in teams and understanding dynamics in an organization.

Course Outcomes: Students will be able to understand a) Management Functions and Organizational Structure b) Organizational Dynamics in terms of Organizational Behaviour, Culture and Climate c) Functional Domain Knowledge d) Processes and Systems d) External and Internal Environment Impact on the Organization.

Approach to Summer Internship:

- Students should take covering letter/s from the college, addressed to the organization/professional institutions during the beginning of the second semester coursework.
- The students in consultation with Supervisor / Mentor and head of the department should choose any area / topic of Business Management as per the Syllabus prescribed by the University.
- The students can approach any Business Organizations / Corporate of Public and Private Sectors, Government Departments, Research Organizations, J-Hub, T-Hub, Wehub etc. for the Summer Internship. The students should do the Internship during the summer break.
- Summer Internship report has to be submitted to the Department after approval by the concerned Supervisor/Mentor and the Head of the Department for the Power Point (PPT) Presentation for Evaluation.
- Summer Internship Report is evaluated for 40 marks for Internal Exam and for 60 marks for External Exam.
- The Report has to be evaluated by the Head, Supervisor/ Mentor and the senior faculty of the Department.

EN508HS: ADVANCED COMMUNICATION SKILLS LAB

III Year B.Tech. CSE I-Sem

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3	0	0	3

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

CS512PE: ADVANCED COMPUTER ARCHITECTURE (Professional Elective - I)

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Prerequisites: Computer Organization

Course Objectives

1. To impart the concepts and principles of parallel and advanced computer architectures.
2. To develop the design techniques of Scalable and multithreaded Architectures.
3. To Apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems

Course Outcomes: Gain knowledge of

1. Computational models and Computer Architectures.
2. Concepts of parallel computer models.
3. Scalable Architectures, Pipelining, Superscalar processors, multiprocessors

UNIT - I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT - II

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

UNIT - III

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT - IV

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5,

UNIT - V

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

TEXT BOOK:

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill Publishers.

REFERENCE BOOKS:

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.

2. Advanced Computer Architectures, S.G. Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5. Computer Architecture, B. Parhami, Oxford Univ. Press.

ARTIFICIAL INTELLIGENCE

B.Tech. III Year I/II Semester

L	T	P	C
3	0	0	0

Course Objectives: To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning. Study of Markov Models enable the student ready to step into applied AI.

UNIT - I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents
Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT - II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning
Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes
Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOK:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall, 2010.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

CS714PE: CLOUD COMPUTING (Professional Elective - IV)

IV Year B.Tech. CSE I -Sem

L	T	P	C
3	0	0	3

Pre-requisites:

1. A course on “Computer Networks”
2. A course on “Operating Systems”
3. A course on “Distributed Systems”

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

CS815PE: CYBER FORENSICS (Professional Elective - VI)

IV Year B.Tech. CSE II -Sem

L	T	P	C
3	0	0	3

Prerequisites: Network Security

Course Objectives:

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

UNIT- I

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT - III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT -IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGraw Hill, 2006.

2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

CS701PC: CRYPTOGRAPHY AND NETWORK SECURITY (PC)

IV Year B.Tech. CSE I -Sem

L	T	P	C
3	0	0	3

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

UNIT - I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

CS703PC: CRYPTOGRAPHY AND NETWORK SECURITY LAB (PC)

IV Year B.Tech. CSE I -Sem

L	T	P	C
0	0	2	1

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic.

7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.

8. Write a Java program to implement RSA algorithm.

9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

CS605PC: COMPILER DESIGN LAB

III Year B.Tech. CSE II-Sem

L	T	P	C
0	0	3	1.5

Prerequisites

1. A Course on “Objected Oriented Programming through Java”

Co-requisites

1. A course on “Web Technologies”

Course Objectives

1. To provide hands-on experience on web technologies
2. To develop client-server application using web technologies
3. To introduce server-side programming with Java servlets and JSP
4. To understand the various phases in the design of a compiler.
5. To understand the design of top-down and bottom-up parsers.
6. To understand syntax directed translation schemes.
7. To introduce lex and yacc tools.

Course Outcomes

1. Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
2. Apply client-server principles to develop scalable and enterprise web applications.
3. Ability to design, develop, and implement a compiler for any language.
4. Able to use lex and yacc tools for developing a scanner and a parser.
5. Able to design and implement LL and LR parsers.

List of Experiments

Compiler Design Experiments

1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive Parsing algorithm
3. Write a C program to generate three address code.
4. Implement SLR(1) Parsing algorithm
5. Design LALR bottom up parser for the given language

<program> ::= <block>
<block> ::= { <variabledefinition> <slist> }
| { <slist> }
<variabledefinition> ::= int <vardeflist> ;
<vardeflist> ::= <vardec> | <vardec> , <vardeflist>
<vardec> ::= <identifier> | <identifier> [<constant>]
<slist> ::= <statement> | <statement> ; <slist>
<statement> ::= <assignment> | <ifstatement> | <whilestatement>
| <block> | <printstatement> | <empty>
<assignment> ::= <identifier> = <expression>
| <identifier> [<expression>] = <expression>
<ifstatement> ::= if <bexpression> then <slist> else <slist> endif
| if <bexpression> then <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print (<expression>)
<expression> ::= <expression> <addingop> <term> | <term> | <addingop> <term>
<bexpression> ::= <expression> <relop> <expression>
<relop> ::= < | <= | == | >= | > | !=

<addingop> ::= + | -
<term> ::= <term> <multop> <factor> | <factor>
<multop> ::= * | /
<factor> ::= <constant> | <identifier> | <identifier> [<expression>]
| (<expression>)
<constant> ::= <digit> | <digit> <constant>
<identifier> ::= <identifier> <letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9
<empty> has the obvious meaning
Comments (zero or more characters enclosed between the standard C/Java-style comment brackets /*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Note also that you should worry about the scoping of names.
A simple program written in this language is:

```
{ int a[3],t1,t2;
  t1=2;
  a[0]=1; a[1]=2; a[t1]=3;
  t2=-(a[2]+t1*6)/(a[2]-t1);
  if t2>5 then
    print(t2);
  else {
    int t3;
    t3=99;
    t2=-25;
    print(-t1+t2*t3);   /* this is a comment
                           on 2 lines */
  }
  endif
}
```

CS602PC: COMPILER DESIGN

III Year B.Tech. CSE II-Sem

L	T	P	C
3	1	0	4

Prerequisites

1. A course on “Formal Languages and Automata Theory”
2. A course on “Computer Organization and architecture”
3. A course on “Computer Programming and Data Structures”

Course Objectives:

1. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
2. Topics include phases of compiler, parsing, syntax directd translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.

Course Outcomes:

1. Demonstrate the ability to design a compiler given a set of language features.
2. Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
3. Acquire skills in using lex tool & yacc tool for devleoping a scanner and parser.
4. Design and implement LL and LR parsers
5. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
6. Design algorithms to generate machine code.

UNIT - I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT - II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT - III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCES:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.

CS521PE/IT525PE: COMPUTER GRAPHICS (Professional Elective - II)

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Prerequisites

1. Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
2. A course on “Computer Programming and Data Structures”

Course Objectives

1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes

1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT - I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham’s and DDA Algorithm), mid-point circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT - II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT - IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:

1. "Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCES:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

CS506PC: COMPUTER NETWORKS AND WEB TECHNOLOGIES LAB

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Course Objectives

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyze the traffic flow and the contents of protocol frames

Course Outcomes

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. **Wireshark**
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

Web Technologies Experiments

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
    a. Find the length of a string.
    b. Count no of words in a string.
    c. Reverse a string.
    d. Search for a specific string.

3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages.
    a) Home page
    b) Registration and user Login
    c) User Profile Page
    d) Books catalog
    e) Shopping Cart
    f) Payment By credit card
    g) Order Conformation
6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXT BOOKS:

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES:

1. Deitel H.M. and Deitel P.J., “Internet and World Wide Web How to program”, Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel,” Java How to Program”, Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India

CS503PC: COMPUTER NETWORKS

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Prerequisites

1. A course on “Programming for problem solving”
2. A course on “Data Structures”

Course Objectives

1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT - II

Data link layer: Design issues, framing, Error detection and correction.

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

CYBER SECURITY

B.Tech. III Year I/II Semester

L	T	P	C
3	0	0	0

Prerequisites: NIL

Course objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes: The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT - I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

CS603PC: DESIGN AND ANALYSIS OF ALGORITHMS

III Year B.Tech. CSE II-Sem

L	T	P	C
3	1	0	4

Prerequisites

1. A course on “Computer Programming and Data Structures”
2. A course on “Advanced Data Structures”

Course Objectives

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen’s matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen’s problem, sum of subsets problem, graph coloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook’s theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCES:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

CS702PC: DATA MINING (PC)

IV Year B.Tech. CSE I - Sem

L	T	P	C
2	0	0	2

Pre-Requisites:

- A course on "Database Management Systems"
- Knowledge of probability and statistics

Course Objectives:

- It presents methods for mining frequent patterns, associations, and correlations.
- It then describes methods for data classification and prediction, and data–clustering approaches.
- It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:

- Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Discover the role played by data mining in various fields.
- Choose and employ suitable data mining algorithms to build analytical applications
- Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT - I

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT - III

Classification: Classification and Prediction **–** Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOK:

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

*MC609: ENVIRONMENTAL SCIENCE

III Year B.Tech. CSE II-Sem

L	T	P	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT - I

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

EC600OE: FUNDAMENTALS OF INTERNET OF THINGS (Open Elective – I)

B.Tech. ECE III Year II Semester

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to:

- understand the concepts of Internet of Things and able to build IoT applications
- Learn the programming and use of Arduino and Raspberry Pi boards.
- Known about data handling and analytics in SDN.

Course Outcomes: Upon completing this course, the student will be able to

- Known basic protocols in sensor networks.
- Program and configure Arduino boards for various designs.
- Python programming and interfacing for Raspberry Pi.
- Design IoT applications in different domains.

UNIT – I

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT - II

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT – III

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi

UNIT - IV

Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

UNIT - V

Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:

1. "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. “Make sensors”: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media, 2014.
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

REFERENCE BOOKS:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

MT800OE: FUNDAMENTALS OF ROBOTICS (Open Elective - III)

B.Tech. Mechatronics IV Year II Sem.

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Brief history, Classification of robot, Elements of robots joints, links, actuators, and sensors

UNIT – II

Components of the Industrial Robotics: Position and orientation of a rigid body, Homogeneous transformations, Introduction to D-H parameters and its physical significance, Orientation of Gripper, Direct and inverse kinematics serial robots, Examples of kinematics of common serial manipulators.

UNIT – III

Principles of Robot Control: Planning of trajectory, Calculation of a link velocity and acceleration, Calculation of reactions forces, Trajectory-following control.

UNIT – IV

Robot programming: Robot programming methods, Robot programming languages, Requirements of a programming robots system, The robot as a multitasking system: Flow Control, Task Control.

UNIT – V

System integration and robotic applications: Robot system integration, Robotic applications.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robot technology fundamentals / James G. Keramas / Cengage Publications

REFERENCE BOOKS:

1. Introduction to Robotics / John J Craig / Pearson Edu.
2. Applied Robotics / Edwin Wise / Cengage Publications.
2. Robotics / Fu K S / McGraw Hill.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall.
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

CS501PC: FORMAL LANGUAGES AND AUTOMATA THEORY

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Course Objectives

1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing.
5. To understand deterministic and non-deterministic machines.
6. To understand the differences between decidability and undecidability.

Course Outcomes

1. Able to understand the concept of abstract machines and their power to recognize the languages.
2. Able to employ finite state machines for modeling and solving computing problems.
3. Able to design context free grammars for formal languages.
4. Able to distinguish between decidability and undecidability.
5. Able to gain proficiency with mathematical tools and formal methods.

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT - III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Griebech Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

UNIT - V

Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

REFERENCE BOOKS:

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

CS523PE: INFORMATION RETRIEVAL SYSTEMS (Professional Elective - II)

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	3

Prerequisites:

1. Data Structures

Course Objectives

1. To learn the important concepts and algorithms in IRS
2. To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:

1. Ability to apply IR principles to locate relevant information large collections of data
2. Ability to design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT - V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCES

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

*MC510: INTELLECTUAL PROPERTY RIGHTS

III Year B.Tech. CSE I-Sem

L	T	P	C
3	0	0	0

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

CS604PC: MACHINE LEARNING LAB

III Year B.Tech. CSE II-Sem

L	T	P	C
0	0	3	1.5

Course Objective: The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes: After the completion of the course the student can able to:

1. understand complexity of Machine Learning algorithms and their limitations;
2. understand modern notions in data analysis-oriented computing;
3. be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)

2. Extract the data from database using python

3. Implement k-nearest neighbours classification using python

4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm