

Detailed Syllabus for Computer Science & Business Systems



DEPT. OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR



PREAMBLE

Education plays an enormously significant role in the building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system is churning out youth who have to compete locally, regionally, nationally as well as globally. The present alarming situation necessitates transformation and/or redesigning of system, not only by introducing innovations but developing “learner-centric approach”.

Majority of Indian higher education institutions have been following marks or percentage-based evaluation system, which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests can choose inter-disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS), an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also explore additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate benchmarking of our courses with best international academic practices.

Advantages of the choice based credit system:

- Shift in focus from the teacher-centric to student-centric education.
- Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).
- CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students.
- CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations.
- CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred to another institution.

CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions have been moving from the conventional annual system to semester system. Currently many of the institutions have already introduced the Choice Based Credit System. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The Choice Based Credit System provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses to acquire more than the required credits and adopt an interdisciplinary approach to learning.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

It has been a necessity to align higher education with the emerging needs of the economy so as to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship since last few years. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner while developing a well-groomed graduate. CSE department aims to encourage research and innovation in the field of Machine Learning, Cyber security, Artificial Intelligence and other allied areas such as Computational Theory, Cloud Computing, Blockchain Technology, Data Science, Big Data Analytics and many more. The objective of the Computer Science & Business Systems Programme is to prepare students to undertake careers involving innovative technologies, develop a problem solving capability, management skills or to opt for advanced studies for research oriented careers.

In order to give due importance to practical applications as well as theoretical aspects of CSE, the curriculum for the Computer Science & Business Systems Programme covers most of the foundational aspects as well as develops engineering and Management skills for problem solving.

JOB OPPORTUNITIES

Booming IT sector in India has plenty of jobs for fresh Computer Science & Business Systems graduates. Candidates with a high percentage of mark and good communication skills as well as sound computer knowledge do not face problem in getting a job. Computer engineers can get jobs in non-IT companies like universities, research, private and public industries, government departments, business organizations, commercial organizations and the manufacturing sector, etc. Besides the Computer Engineers have plenty of options to work in IT companies in departments such as design, development, assembly, manufacture, and maintenance, etc. Software Developers: Software developers are professionals who are concerned with facets of the software development process which involves activities such as design and coding, computer programming, project management, etc.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 01: High Quality Engineering Design and Development Work: Graduates of the program will engage in the effective practice of computer science and engineering to identify and solve important problems in a diverse range of application areas.

PEO 02: Real Life Problem Solving: To educate students with proficiency in core areas of Computer science & Engineering and related engineering so as to comprehend engineering trade-offs, analyze, design, and synthesize data and technical concepts to create novel products and solutions for the real life problems.

PEO 03: Leadership: Graduates of the program will engage in successful careers in industry, academia and attain positions of importance where they have impact on their business, profession and community.

PEO 04: Lifelong Learning: Graduates of the program will adapt to contemporary technologies, tools and methodologies to remain at the frontier of computer science and engineering practice with the ability to respond to the need of a challenging environment.

PEO 05: Management Skill: Prevail technical competency to concord the industry engrossment. Assimilate business management skills and instigate business level innovation with societal consideration.

PROGRAM OUTCOME (PO)

PO	Summary	Description
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design /development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities

		relevant to the professional engineering practice.
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

TYPES OF COURSES

1. Courses are the subjects that comprise the Computer Science & Business Systems Programme.
2. A course may be designed to comprise lectures, tutorials, laboratory work, fieldwork, outreach activities, project work, vocational training, viva, seminars, term papers, assignments, presentations, self-study etc. or a combination of some of these components.
3. The learning outcomes of each course will be defined before the start of a semester.
4. Following are the course types:
 - i. **Core Course (CC):** This is a course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of B.Tech in Computer Science & Business Systems.
 - ii. **Elective Course:** An elective course is a course, which can be chosen from a pool of courses. It is intended to support the discipline of study by providing an expanded scope, enabling exposure to another discipline/domain and nurturing a student's proficiency and skill. An elective may be of following types:
 - a) **Discipline Elective Courses (DE):** It is an elective course that adds proficiency to the students in the discipline.
 - b) **Open Elective Courses (OE):** It is an open elective course taken from other engineering disciplines and enhances the generic proficiency and interdisciplinary perspective of students.
 - iii. **Obligatory Courses:**
 - a) **Mandatory Courses (MC):** It can be taken from among a pool of foundation courses, which aim at value-based education. They may provide hands-on training to improve competencies and skills or provide education on human, societal, environmental and national values.
 - b) **Self-Learning/Internship/Training/Project/Dissertation (PTI):** Course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project
 - c) **Humanities, Social Sciences & Management (HSM):** It is an elective course taken from non-engineering disciplines (humanities, social sciences and management) that broadens the perspective of an engineering student.
 - d) **Basic Science Courses (BSC):** It is based upon content that leads to fundamental knowledge enhancement in sciences, and basic engineering principles.
 - e) **Engineering Science Courses (ESC):** It is based upon content that leads to fundamental knowledge enhancement in basic Engineering Principles.
 - f) **NPTEL (NPT):** "Essential Studies for Professionals Skill & Skill Development for Professionals" courses designed to encourage and enrich the students for the technical and professional exams.
 - g) **General Studies Courses (GSC):** "Essential Studies for Professionals Skill & Skill Development for Professionals" courses designed to encourage and enrich the students for the technical and professional exams.
 - h) **Mandatory Additional Requirements (MAR):** A student has to do the following things to achieve the MAR points: The student should engage herself / himself in activities outside the

curriculum. Join different types of Clubs of NSCBIP, write something for the wall magazine, remain active in outer society, participate in Tech Fests activities, etc.

5. Each credit course contributes certain credits to the programme. A course can be offered either as a full course (4 credits) or as a half course (2 credits). A full course is conducted with 3 hours of lectures and either 1 hour of tutorial or 2 hours of practical work per week. A half course is conducted with 2 hours of lectures. There are also some exceptional electives with 3 credits and 1 credit.

Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week Or 2 Hr. Practical (Lab)/week	0.5 Credits Or 1 Credit

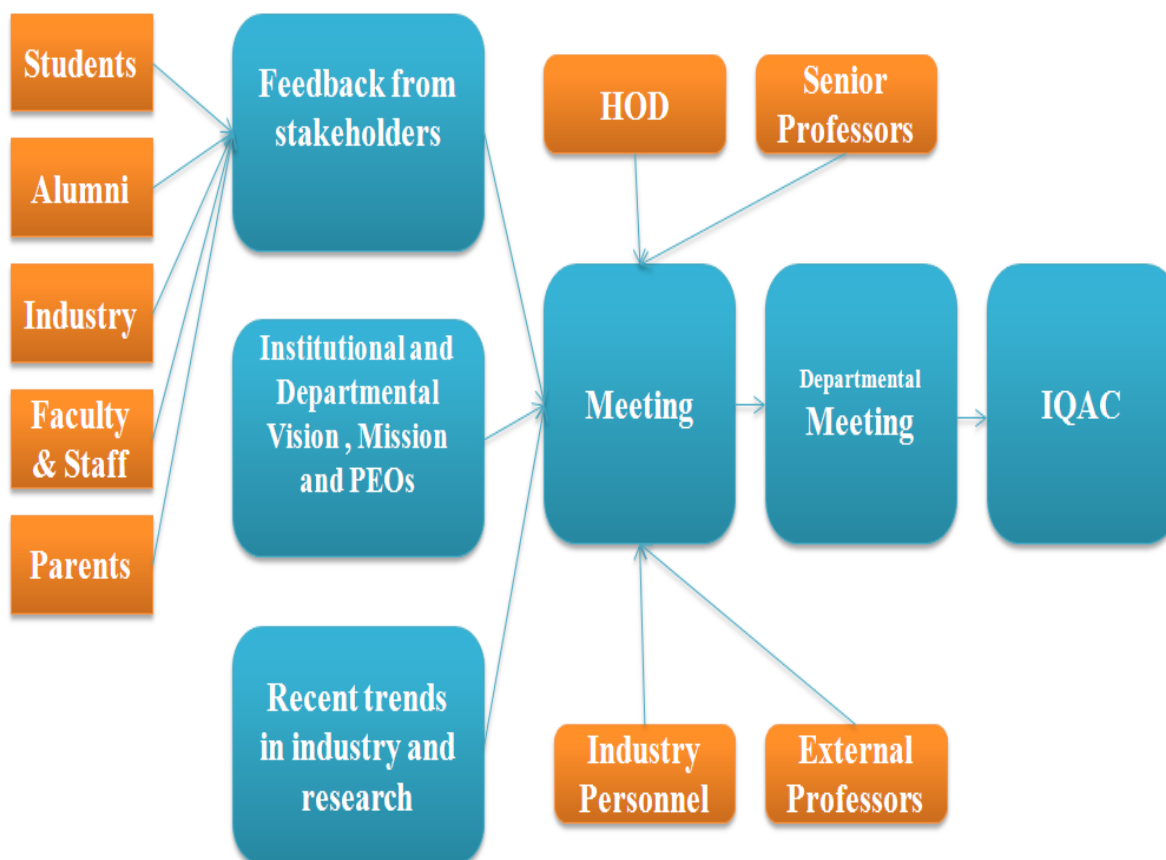
6. A project work/dissertation is considered as a special course involving application of the knowledge gained during the course of study in exploring, analyzing and solving complex problems in real life applications. A candidate completes such a course with an advisory support by a faculty member.
7. **Mandatory Courses** may be offered. They do not carry credits but aim at expanding knowledge or bridging deficiency in knowledge or skill.
8. A course may have pre-requisite course(s) that are given in the Semester-wise Course Allocation scheme.
9. A student can opt for a course only if he/she has successfully passed its pre- requisite(s).
10. A student has to register for all courses before the start of a semester.
11. **Program codes:** The codes for various undergraduate programmes are as follows:
 - i. Civil Engineering: CE
 - ii. Computer Science & Engineering: CS
 - ii. Computer Science & Business Systems: CSBS
 - iii. Electronics and Communication Engineering: EC
 - iv. Electrical Engineering: EE
 - v. Mechanical Engineering: ME
12. **Departmental Course Codes:** The codes for departmental core courses and discipline-specific electives are specific to each discipline. The first two characters are derived from departmental codes listed above. The third character is 'C' for core courses and 'D' for discipline-specific courses and 'INT' for Dissertation/Project/Training/Internship. This is followed by a digit sequence number:
 - i. CBCyyy: Core Course
 - ii. CBDyyy: Discipline-Specific Elective Course
 - iii. XXXyyy: Open Elective Courses (Depends on the respective Dept.)
 - iv. INTyyy: Self-Learning/Dissertation/Project/Training/Internship
13. **Common Elective Course Codes:** All disciplines will follow a common code as shown below. The 3-digit sequence number 'yyy' is taken from the respective tables of different types of courses.
 - i. HSMyyy: Humanities, Social Sciences & Management Course
 - ii. BSCyyy: Basic Science Course

- iii. MCyyy: Mandatory Course
 - iv. GSCyyy: General Studies Courses
Here, yyy will be follow by a sequence of digit.
14. **General Electives:** A student may take a course under the category of General Elective (GE) offered by any other Department of the Institute under the categories of Core Course (CC) and Discipline Specific Electives (DE). However, such options shall be offered to a student as per prescribed guidelines of the Institute.
 15. The opting of a course by the student will depend upon the requisites for that course and with the consent of the course advisor.

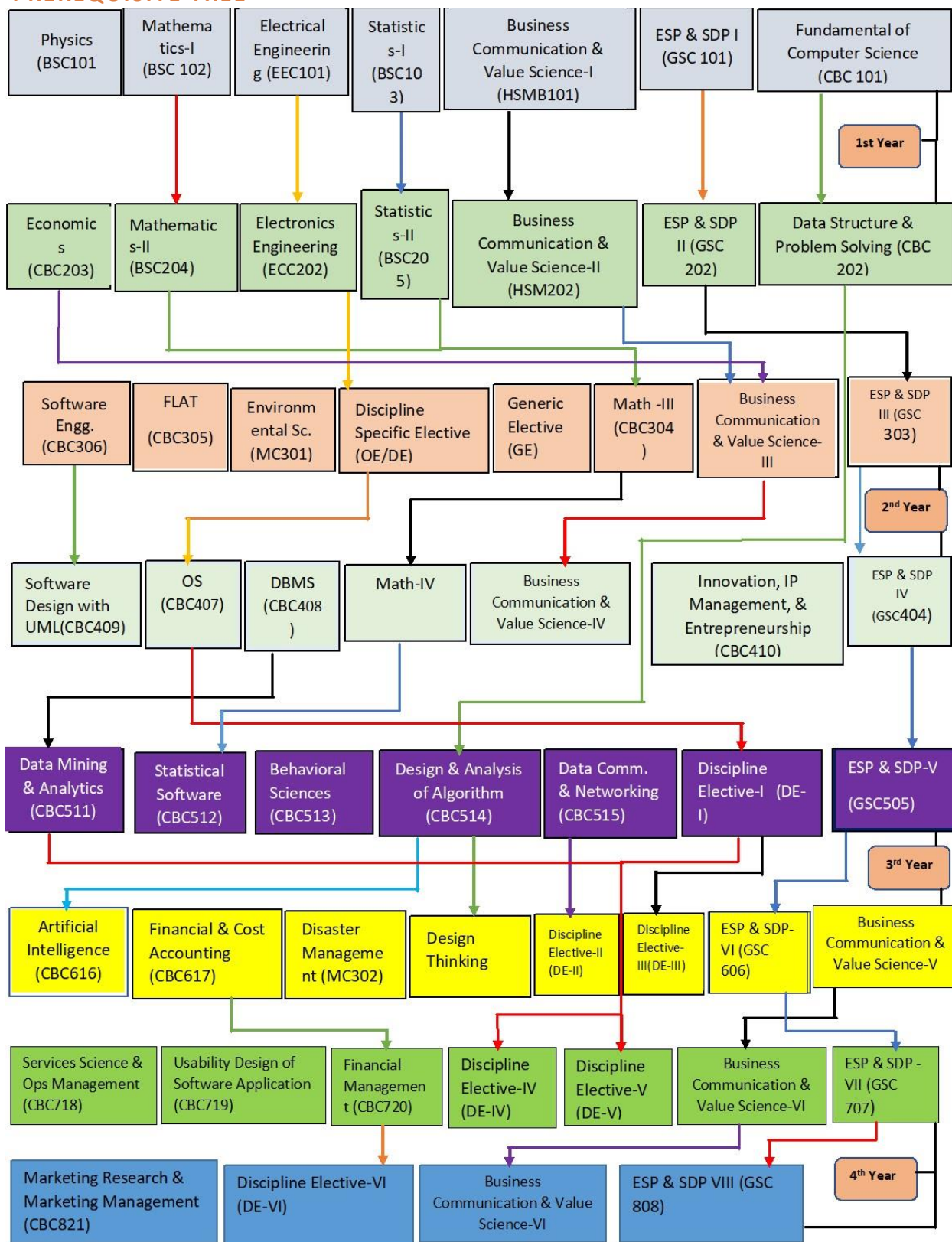
PROCESS FOR DESIGNING THE PROGRAM CURRICULUM

The process for designing the program curriculum involves consideration of the following aspects:

- i) Feedback from stakeholders
- ii) Institutional and Departmental Vision, Mission and PEOs
- iii) Recent trends in industry and research



PREREQUISITE TREE



SCHEME – SEMESTER WISE COURSE ALLOCATION

First Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	BSC	BSC101	Fundamental of Physics	3	1	2	4
2.	BSC	BSC102	Mathematics-I	3	1	0	4
3.	BSC	BSC103	Statistics-I	3	1	0	4
4.	ESC	EEC101	Principal of Electrical Engineering	3	0	2	4
5.	CC	CBC101	Fundamental of Computer Science	3	0	2	4
6.	HSM	HSM101	Business Communication & Value Science-I	2	0	2	3
7.	GSC	GSC101	ESP & SDP-I	2	0	0	2
8.	HSM	HSM181	Design Thinking & Innovation-I	0	0	1	0.5
Total				19	3	8	25.5/32

Students will undergo a mandatory induction program

TITLE OF COURSE: FUNDAMENTAL OF PHYSICS

COURSE CODE: BSC101

L-T-P: 3-1-2

CREDITS: 4

Pre-requisites: Knowledge of Class XII level Physics and Mathematics

Introduction:

The course introduces fundamental concepts of physics

Course Outcomes:

CO1. To understand the Importance of applications of Applied Physics in daily life

CO2. To provide students with a basic understanding of the Physics that may be required by engineers in the course of their careers

CO3. To impart knowledge related to the importance of EM waves and magnetic materials

CO4. To enhance knowledge related to lasers and its different components to make it suitable for various purposes

CO5. To introduce most important concepts of superconductivity, crystallography and fiber optics to the students

CO 6. To introduce the learners to the basics of Special theory of relativity, X- rays, Quantum Mechanics

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓										
CO3	✓			✓								
CO4	✓	✓										
CO5	✓		✓									
CO6	✓			✓								

Course Contents:

MODULE – I

Oscillations: Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple spring's mass system. Resonance-definition., damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators

MODULE – II

Classical Optics: Theory of interference fringes-types of interference-Fresnel's prism Newton's rings, Diffraction-Two kinds of diffraction-Difference between interference and diffraction- Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence, Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction.

MODULE – III

Quantum Physics: Introduction - Planck's quantum theory- Matter waves, de-Broglie wavelength, Heisenberg's Uncertainty principle, time independent and time dependent Schrödinger's wave equation, Physical significance of wave function, Particle in a one dimensional potential box, Heisenberg Picture.

MODULE – IV

X-ray & Crystallography: Crystallography - Basic terms-types of crystal systems, Bravais lattices, miller indices, d spacing, Debye Scherrer powder method, laue method- Atomic packing factor for SC, BCC, FCC and HCP structures. Semiconductor Physics - conductor, semiconductor and Insulator; Basic concept of Band theory

MODULE – V

Modern Optics: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO₂ and Neodymium lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.

MODULE – VI

Thermodynamics: Zeroth law of thermodynamics, first law of thermodynamics, determination of J by Joule's method, Applications of first law, heat engines, Carnot's cycle and Carnot's engine, second law of thermodynamics, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

Home Assignments:

Problems based on Newton rings, Michelson interference, young double slit

Laboratory

- 1) Magnetic field along the axis of current carrying coil – Stewart and Gee
- 2) Determination of Hall coefficient of semiconductor
- 3) Determination of Plank constant
- 4) Determination of wavelength of light by Laser diffraction method
- 5) Determination of wavelength of light by Newton's Ring method
- 6) Determination of laser and optical fiber parameters
- 7) Determination of Stefan's Constant.

Text Books:

1. Halliday, Resnic and Walker, Fundamentals of Physics, 9th Ed., John Wiley, 2011.
2. Beiser A, Concepts of Modern Physics, 5th Ed., McGraw Hill International, 2003.
- 15 Computer Science and Business Systems
3. Ajoy Ghatak, Optics, 5th Ed., Tata McGraw Hill, 2012
4. University Physics-Sears & Zemansky (Addison-Wesley)

Reference Books:

1. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
2. Basic Engineering Physics-I -Sujoy Bhattacharya, Saumen Paul (TMH)

TITLE OF COURSE: FUNDAMENTAL OF PHYSICS LAB

COURSE CODE: BSC191

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Basic knowledge about measurement techniques by vernier calipers and screw gauge. Basic concepts of 12th standard physics. Basic knowledge of algebraic calculation and graph plot.

Introduction:

This course examines data structures and algorithms basics using python. The Topics to be covered (tentatively) include: an introduction to programming and problem solving in Python with basic concepts such as conditionals, loops, functions, lists, strings and tuples; Time and space analysis of algorithms; Linear Data structures like array, linked list, stack, queue; Non-linear Data structures like graph and tree; Sorting; Searching and Hashing.

Course Outcomes (CO):

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

CO1: Develop familiarity with range of experimental methods.

CO2: Design, perform, document and analyze experiments in physics.

CO3: Learn to work in a group.

CO4: Verify the theories learnt with the help of instruments and measurement techniques, learn the sources of error in the experiment and calculate the error percentage.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								
CO2	✓	✓	✓	✓								
CO3								✓	✓	✓	✓	
CO4	✓	✓	✓	✓								

Course Contents:

Experiment-1:

Determination of the Young's modulus of elasticity of the material of a given bar by flexure method.

Link for the experiment: <https://vlab.amrita.edu/?sub=1&brch=280&sim=1509&cnt=1>

Experiment-2:

Study the formation of Newton's rings in the air-film in between a plano-convex Lens and a glass plate using nearly monochromatic light and hence to determine the Radius of curvature of the plano-convex lens

Link for the experiment:

http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/engg_physics/labs/exp1/simulation.php

Experiment-3:

Determination of the modulus of rigidity of the material of a rod by static / dynamic method.

Link for the experiment:

<https://vlab.amrita.edu/?sub=1&brch=280&sim=602&cnt=1>

<http://vlab.amrita.edu/?sub=1&brch=74&sim=1523&cnt=4>

Experiment-4:

Determination of the wavelength of a given LASER source by forming diffraction pattern with a plane transmission grating.

Link for the experiment:

<http://vlab.amrita.edu/index.php/index.php?sub=1&brch=189&sim=334&cnt=4>

Experiment-5:

Study the Current vs. Voltage curve for a solar cell under various illumination conditions.

Link for the experiment: <http://vlab.amrita.edu/?sub=1&brch=195&sim=360&cnt=1>

Experiment-6:

Determination of Planck's constant by photoelectric emission process.

Link for the experiment: <http://vlab.amrita.edu/?sub=1&brch=195&sim=547&cnt=1>

Experiment-7:

Determination of the band-gap of a semiconductor by measuring the resistivity at different temperatures by four-probe method

Link for the experiment: <https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1>

Experiment-8:

Calculation of Stefan- Boltzmann Constant using the concept of black body radiation

Link for the experiment:

http://htv-au.vlabs.ac.in/heat-thermodynamics/Black_Body_Radiation/index.html

Experiment-9:

Determination of e/m by Thomson's experiment.

or

Millikan oil drop experiment.

Link for the experiment: Link not available

Or

<https://vlab.amrita.edu/?sub=1&brch=195&sim=357&cnt=1>

Experiment-10:

Determination of the resistance per unit length of a wire using Carey Foster bridge.

Link for the experiment: <https://vlab.amrita.edu/?sub=1&brch=192&sim=346&cnt=1>

Experiment-11:

Determination the excitation potential of a given gas by Franck-Hertz experiment.

Link for the experiment: <http://vlab.amrita.edu/?sub=1&brch=195&sim=355&cnt=1>

Experiment-12:

Medle's Experiment: To determine the frequency of a electrically driven Tuning Fork.

Link for the experiment: <https://vlab.amrita.edu/?sub=1&brch=201&sim=882&cnt=1>

Experiment-13:

Determination of acceleration due to gravity (g) using bar pendulum.

A student will perform any 10 experiments of the above list in a given semester.

Text Books

1. Theory and problems of Vector analysis –Murray R Spiegel, Schaum's outline series, McGraw-Hill book Company, SI (metric) edition
2. Theory and problems of Theoretical Mechanics by Murray R. Spiegel SI(Metric) edition.
3. Advanced Acoustics – Dr. D. P. Raychaudhuri, The new book stall, Revised Ninth Edition, 2009
4. A textbook on Optics, B. Ghosh and K. G. Majumder, Sreedhar Publishers, fifth edition

References

1. Introduction to Electrodynamics by David J. Griffiths 3rd Edition
2. Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill)

TITLE OF COURSE: MATHEMATICS-I

COURSE CODE: BSC102

L-T-P: 3-1-0

CREDITS: 4

Pre requisites: The students should have basic Knowledge of high school math, including trigonometry, geometry and calculus

Introduction:

The course introduces fundamental concepts of Calculus and Discrete Mathematics.

Course Outcomes:

CO1. Evaluate double integral and triple integral to compute area, volume for two dimensional and three-dimensional solid structure.

CO2 Understand and apply basic concepts of Boolean algebra.

CO3 To recall the basic concepts of sets, functions and relations.

CO4. Develop fundamental understanding of Elementary Combinatory.

CO5. Understand various concepts of algebraic systems.

CO6. Student will be able to prove mathematical statements using induction method.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓						✓	✓		✓
CO2	✓	✓		✓	✓				✓			✓
CO3	✓	✓							✓			✓
CO4	✓	✓		✓					✓			✓
CO5	✓	✓	✓						✓			✓
CO6	✓	✓							✓	✓		✓

Course Contents:

MODULE – I

Calculus: Differential calculus and integral calculus, double and triple integral.

MODULE – II

Application of double and triple integral.

MODULE – III

Boolean algebra: Introduction of Boolean algebra, truth table.

MODULE – IV

Basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map.

MODULE – V

Abstract algebra: Set, relation, group, ring, field.

MODULE – VI

Combinatorics: Basic counting, balls and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, strong form of induction, pigeonhole principle.

Home Assignments:

Assignments & tutorials covering the following: Successive differentiation, multiple integral, truth table, Karnaugh map, principle of mathematical induction, strong form of induction and pigeonhole principle.

Reference Books:

1. I. N. Herstein, “Topics in Algebra”, John Wiley and Sons.
2. M. Morris Mano, “Digital Logic & Computer Design”, Pearson
3. B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publication, Delhi.

TITLE OF COURSE: STATISTICS-I

COURSE CODE: BSC103

L-T-P: 3-1-0

CREDITS: 4

Pre-requisites: The students should have basic Knowledge of high school math and calculus

Introduction:

The course introduces fundamental concepts of statistics and probability

Course Outcomes:

CO1. Students will be able to use appropriate statistical terms to describe data.

CO2. Students will be able to use appropriate statistical methods to collect, organize, display and analyze relevant data

CO3. Students will be able to identify the types of sampling.

CO4. Students will be able to understand mathematical expectation and moments generating function.

CO5. Students will be able to apply concepts of various probability distributions to find probabilities.

CO6. Students will be able to apply concepts of Normal, Poisson, Binomial, uniform, exponential, t and F-distribution.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓						✓			✓
CO2	✓			✓	✓							
CO3		✓							✓			✓
CO4	✓	✓		✓					✓			✓
CO5		✓	✓						✓			✓

CO6		✓	✓						✓			✓
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Course Contents:

MODULE – I

Introduction to Statistics: Definition of Statistics. Basic objectives. Applications in various branches of science with examples

Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample.

MODULE – II

Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution. Scatter diagram. Linear regression and correlation. Least squares method. Rank correlation.

MODULE III

Sampling Techniques: Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling

MODULE – IV

Expected values & moments: mathematical expectation & its properties, Moments (including variance) & their properties, interpretation, Moment generating function

MODULE – V

Probability Theory: concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem

MODULE – VI

Probability distributions: discrete & continuous distributions, Binomial, Poisson & Geometric distributions, Uniform, Exponential, Normal, Chi-square, t, F distributions

Home Assignments:

Problem sets to be shared by faculty covering the following topics:

Graphical representation of data, Histograms, Descriptive measures - central tendency and dispersion
Estimating moments, Distribution parameters, Simulation

Text Books:

1. Introduction of Probability Models, S.M. Ross, Academic Press, N.Y.
2. Fundamentals of Statistics (vol. I and vol. II) - A. Goon, M. Gupta and B. Dasgupta.

Reference Books:

1. A first course in Probability, S.M. Ross.
2. Probability and Statistics for Engineers (4th Edition) - I.R. Miller, J.E. Freund and R. Johnson.
3. Statistical Concepts & Methods - G.K. Bhattacharyya and R.A. Johnson.
4. Introduction to the Theory of Statistics - A.M. Mood, F.A. Graybill & D.C. Boes.

TITLE OF COURSE: PRINCIPAL OF ELECTRICAL ENGINEERING

COURSE CODE: EEC101

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: The Students should have knowledge of Mathematics, physics

Introduction:

The course introduces fundamental concepts of DC and AC circuits, Electrostatics, electromagnetism, transformer, electrical wiring.

Course Outcomes:

After learning this course the students will be able to

CO1. Apply knowledge of basic concepts of work, power, and energy for electrical, mechanical and thermal systems

CO2. Calculate current in electrical network using Kirchoff's laws and network theorems.

CO3. Describe construction, principle of operation, specifications and applications of capacitors and batteries

CO4. Define basic terms of single phase and three phase ac circuits and supply systems.

CO5. Describe and apply fundamental concepts of magnetic and electromagnetic circuits for operation of single phase transformer.

CO6. Describe types of wiring and earthing system.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓						
CO2	✓	✓	✓			✓						
CO3	✓	✓	✓	✓				✓				
CO4	✓	✓			✓							
CO5	✓			✓								
CO6	✓	✓	✓	✓			✓					

Course Contents:

MODULE – I

Basic Concepts: Concept of EMF, Potential Difference, current, resistance, Ohms law, resistance temperature coefficient, SI Modules of Work, power, energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems

MODULE – II

Network Theorems: Voltage source and current sources, ideal and practical, Kirchoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series

parallel, Star/Delta transformation. Superposition theorem, Thevenin's theorem, Max Power Transfer theorem.

MODULE III

Electrostatics: Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series & parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction & working.

MODULE – IV

AC Fundamentals & AC Circuits: AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar & rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3-ph balanced AC Circuits.

MODULE – V

Magnetic Circuits & Transformer: Magnetic effect of electric current, cross and dot convention, right hand thumb rule, concept of flux, flux linkages, Flux Density, Magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability, Ampere's law, BH curve, hysteresis loop, series-parallel magnetic circuit, composite magnetic circuit, Comparison of electrical and magnetic circuit Faraday's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling, Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.

MODULE – VI

Electrical Wiring and Illumination system: Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED), Introduction to measuring devices/sensors and transducers related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems and their practical application. :

TITLE OF COURSE: PRINCIPAL OF ELECTRICAL ENGINEERING LAB

COURSE CODE: EEC191

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Basics especially class 12th Physics, chapters leading to Electricity, Magnetism and Semiconductors and Mathematics.

Introduction:

1. To learn how we can connect the different elements (like resistance) series and parallel in Bread board.
2. Learn the practical verification of the network theorem with the theoretical results
3. Know about the connection of wattmeter, and how the power can be calculated for a given load by

using a particular wattmeter.

Course Outcomes (CO):

By doing this practical students will gain the knowledge about the requirement of the breadboard in the circuit connection and the proper way of connection of the elements in the bread board.

Upon the completion of this practical course, the student will be able to:

CO1: Understand the series and parallel connection of the breadboard.

CO2: Understand about the construction of a circuit by using the different electrical elements in a breadboard.

CO3: Understand how the power can be measure of a given load by using a wattmeter.

CO4: Verify the theoretical results with the practical one in different network theorems.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓						✓			
CO2	✓	✓	✓						✓			
CO3	✓	✓	✓						✓			
CO4	✓	✓	✓						✓			

Course Contents:

The term work shall consist of record of minimum eight exercises / experiments.

1. Determination of resistance temperature coefficient
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Kirchoff's Laws
5. Verification of Maximum power transfer Theorem
- 9 Computer Science and Business Systems
6. Time response of RC circuit
7. Study of R-L-C series circuits for $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Direct loading test on Single phase transformer
 - a) Voltage and current ratios.
 - b) Efficiency and regulations.
10. Study of a Residential (L.T.) Bill

Text Books:

1. B.L. Theraja- "A Textbook of Electrical Technology" Volume- I, S.Chand and Company Ltd., New Delhi
2. V. K. Mehta, - "Basic Electrical Engineering", S. Chand and Company Ltd., New Delhi
3. I. J. Nagrath and Kothari – "Theory and problems of Basic Electrical Engineering", Prentice Hall of India Pvt. Ltd

Reference Books:

1. Edward Hughes – "Electrical Technology"- Seventh Edition, Pearson Education Publication

2. H. Cotton – “Elements of Electrical Technology”, C.B.S. Publications
3. John Omalley Shawn – “Basic circuits analysis” Mc Graw Hill Publications
4. Vincent Del Toro – “Principles of Electrical Engineering”, PHI Publications

TITLE OF COURSE: FUNDAMENTAL OF COMPUTER SCIENCE

COURSE CODE: CBC101

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Knowledge of Class XII level computers will be helpful, but not mandatory.

Introduction:

Computer is an advanced electronic device that takes raw data as an input from the user and processes it under the control of a set of instructions (called program), produces a result (output), and saves it for future use. This course introduces fundamental concepts of computer science.

Course Outcomes:

CO1. Understand the basics of computer science & the process of moving from a problem statement to a computational formulation of a method for solving the problem.

CO2. Apply the basic concepts of control structures.

CO3. Understand basic concepts of function.

CO4. Implement concept of arrays and pointers.

CO5. Develop an application using the concept of file handling.

CO6. Describe unix system interface and programming method.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO2	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO5	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO6	✓	✓	✓	✓	✓			✓	✓	✓		✓

Course Contents:

MODULE – I

General problem Solving concepts and Imperative languages: Algorithm, and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops. Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C) .**Types Operator and Expressions with discussion of variable naming and Hungarian Notation:** Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation

MODULE – II

Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, Goto Labels, structured and un- structured programming

MODULE – III

Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Preprocessor, Standard Library Functions and return types

MODULE – IV

Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialisation of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

MODULE – V

Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, Typedef, Unions, Bit-fields

Input and Output: Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, stdout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions

MODULE – VI

Unix system Interface: File Descriptor, Low level I/O – read and write, Open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator

Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility.

Home Assignments:

1. Algorithm and flowcharts of small problems like GCD
2. Structured code writing with:
 - i. Small but tricky codes
 - ii. Proper parameter passing
 - iii. Command line Arguments
 - iv. Variable parameter
 - v. Pointer to functions
 - vi. User defined header
 - vii. Make file utility
 - viii. Multi file program and user defined libraries
 - ix. Interesting substring matching / searching programs
 - x. Parsing related assignments

Text Books:

1. B. W. Kernighan and D. M. Ritchi, “The C Programming Language”, Second Edition, PHI.
2. B. Gottfried, “Programming in C”, Second Edition, Schaum Outline Series.

Reference Books:

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill.
2. Yashavant Kanetkar, "Let Us C", BPB Publications.

TITLE OF COURSE: FUNDAMENTAL OF COMPUTER SCIENCE LAB

COURSE CODE: CBC191

L-T-P: 0-0-2

CREDITS: 1

Pre-requisites: Knowledge of Class XII level computers will be helpful, but not mandatory.

Introduction:

This Lab covers topics ranging from basic computing principles to the mathematical foundations required for computer science. You will learn fundamental concepts of how computers work, which can be applied to any software or computer system. You will also gain the practical skillset needed to write interactive, graphical programs at an introductory level. The numerical mathematics component will provide you with numerical and computational tools that are essential for the problem solving and modelling stages of computer science.

Course Outcomes:

CO1. Understand the basics of computer science & the process of moving from a problem statement to a computational formulation of a method for solving the problem.

CO2. Apply the basic concepts of control structures.

CO3. Understand basic concepts of function.

CO4. Implement concept of arrays and pointers.

CO5. Develop an application using the concept of file handling.

CO6. Describe unix system interface and programming method.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO2	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO5	✓	✓	✓	✓	✓			✓	✓	✓		✓
CO6	✓	✓	✓	✓	✓			✓	✓	✓		✓

All experiment must be done using gcc or dev c/Turbo c

Assignment 1: implementation of various operators in C

Assignment 2: Design of different patterns, accessing lists and other structures using loops.

Implementation of different conditional statements.

Assignment 3: Switch case

Assignment 4: Array fundamentals

Assignment 5: Advanced array programming with functions

Assignment 6: Pointers and functions
Assignment 7: Creation of array using pointers
Assignment 8: Structures and union
Assignment 9: Creation of basic data structures using pointers and structure
Assignment 10: Dynamic memory allocation
Assignment 11: pre-processor and their utility
Assignment 12: File handling programs in C

Online Platform for Code Sharing to be used like Google Colab/Github/Kaggle(Mandatory)

List of Experiments

Experiment 1: Write a program in C to compute the average of a few inputs given by the use.
Experiment 2: Write a program in C to swap 2 numbers using a user defined function and print the values in main.
Experiment 3: Write down the importance of type conversion with example.
Experiment 4: Write a program in C to reverse a number.
Experiment 5: Write a program to find largest number between two numbers.
Experiment 6: Write a program to find a character is vowel or not using switch case.
Experiment 7: Write a program to find a given number is even or odd?
Experiment 8: Write a program in C that will find the sum of the series:
Experiment 9: Write a C program to print the following pattern using loop control instructions.
Experiment 10: Write a program to calculate the sum of cubes of first n numbers
Experiment 11: Write a C program to determine the factorial of a given number
Experiment 12: Write a program in C that will find the sum of the following series:
Experiment 13: Write a C program to print the following pattern using loop control instructions:
Experiment 14: Write a program in C that will concatenate two strings.
Experiment 15: Write a C program to calculate the number of vowels present in the string. Experiment 16: Write a program in C to calculate number of characters present in a string. Experiment 16: How does one-dimensional array differ from two-dimensional array? Experiment 18. Write a program in C that will reverse a string.
Experiment 19: Write a program in C to sort a single dimension array in an ascending order.
Experiment 20: Write a program in C that will find area and circumference of a circle using a user defined function calc(). Take input and display the output in main().
Experiment 21: Write a program of factorial using recursive function.
Experiment 22: Write a program to define a structure of a student which contains roll, name, section etc. Then you need to find a record using a given roll.
Experiment 23: Write a program to read and write a file.

Text Books:

1. B. W. Kernighan and D. M. Ritchi, "The C Programming Language", Second Edition, PHI.
2. B. Gottfried, "Programming in C", Second Edition, Schaum Outline Series.

Reference Books:

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill.
2. Yashavant Kanetkar, "Let Us C", BPB Publications.

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE-I

COURSE CODE: HSM101

L-T-P: 2-0-2

CREDITS: 3

Pre-requisites:

1. Basic communication in tenses (past, present, future).
2. Awareness of common words (adjectives used in daily verbal communication).
3. Basic idea of sentence formation and thereby paragraph building and writing.
4. Communication according to daily and varied contextual scenarios.
5. Basic communication model/channel (sender, receiver and feedback), Active and passive listening skills.
6. Basic social etiquettes and knowledge of group work and communication that will enhance their professional growth.

Introduction:

The course aims to augment student's overall communication and interpersonal skills by engaging them in group activities and thus aid in helping them to emerge as professionals. The English language topics for this semester focus on the development of basic fluency in English, usage of words and also introduce them to the concept and importance of interpersonal skills so as to effectively present their personalities.

Course Outcomes:

CO1. Speak fluently in English without errors in tenses and hence present themselves as effective English communicators. They will be able to learn the 12 tenses and use them appropriately.

CO2. Differentiate between active and passive vocabulary and be able to use the 60 words discussed in class for their daily conversation and 40 words also given as assignments.

CO3. The ability to process their ideas and thoughts (verbal communication) into written communication in an effective, coherent and logical manner within a stipulated time and specific word limit of 100-150 words for paragraph writing.

CO4. Present them in a certain manner by using the 50-55 phrases discussed in class appropriately for group discussions, personal interviews during the campus recruitment process/competitive exams.

CO5. Enhance their communication skills by acquainting with the 2 important aspects of communication and helping them to overcome the 10 most common barriers of communication. Learn the 7 different types of listening skills; differentiate effective listening skills and understand the importance of it through 5 activities held in class and implement them in professional life.

CO6. Understand the importance of team work, team motivation and effective team communication for further implementation in the corporate life. They should also be able to identify concretely between team and group dynamics.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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Course Contents:

MODULE – I

Essential Grammar – I:

Tenses: Basic forms and use, sentence formation (general & Technical), Common errors, Parts of speech through context, Direct and reported speech structures and voices.

MODULE – II

Vocabulary Enrichment: Exposure to words from General Service List (GSL) by West, Academic word list (AWL) technical specific terms related to the field of technology, phrases, idioms, significant abbreviations formal business vocabulary

Phonetic: Pronunciation, Reduction of MTI in spoken English, Question formation with emphasis on common errors made during conversation

MODULE – III

Written Communication – I: Letter Writing –Formal and Informal letter writing, Application letters, Report writing academic and business report, Job application letter

MODULE – IV

Communication Skills: Importance of effective communication, types of communication- verbal and non - verbal, barriers of communication, effective communication, Listening Skills: Law of nature- Importance of listening skills, Difference between listening and hearing, Types of listening.

MODULE – V

Self - Awareness & Self Development: Self - Assessment, Self - Appraisal, SWOT, Goal setting - Personal & career- Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self - appraisal, Personal Goal setting, Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, and prioritization
Socio-Cultural and Cross-Cultural Sensitivities at the Workplace: What is Inclusion? Women's contributions in Industry, work issues faced by women, what is sexual harassment, what is appropriate behavior for everyone at work

MODULE – VI

Interpersonal Skills – I: Team work, Team effectiveness, Group discussion, Decision making - Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity

Time Management: The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan, how to handle interruptions, to maximize your personal effectiveness, how to say “no” to Time wasters

Values of a good manager: Understanding Corporate Values and behavior; Personal / Human Values; Pride and grace in Nationalist

Text Books:

1. Business Communication – Dr. Saroj Hire math
2. English vocabulary in use – Alan McCarthy and O’Dell

Reference Books

1. Strategic Writing by Charles Marsh
2. The Seven Basic Plots by Christopher Booker

TITLE OF COURSE: ESP & SDP-I

COURSE CODE: GSC101

L-T-P: 2-0-2

CREDITS: 2

Pre-requisite: Basic concepts in mathematics, English

Introduction:

The Topics will be covered (tentatively): Aptitude, Indian Constitution and Governance, Basic English and Data Interpretation.

Course Outcomes (CO):

Students are expected to be capable numerical problems, literature, and basic of Indian constitution. To reach this goal, the following objectives need to be met:

CO1: Students would be able to design & implement any basic numerical problem properly.

CO2: Students would be able to know basic English language and communicate with the society.

CO3: Students would be able to know basic Indian constitution.

CO4: Students would be able to stress management by doing Yoga

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Essential Studies for Professionals-I

Section-A: Employment Enhancement Skills:

Module-1: Number System:

Numbers, Face value and place value of a digit, Types of numbers, Tests of Divisibility, Factorial of a number, Modulus of a number, greatest integral value, Multiplication by short cut methods, Division Algorithm.

Module-2: HCF and LCM of Numbers:

Factors and Multiples, HCF or GCD, LCM, Product of two numbers, Co-primes, HCF and LCM of fractions, HCF and LCM of decimal fractions, Comparison of fractions,

Module-3: Average & Percentage:

Concepts, Results on population, Results on Depreciation

Module-4: Profit and Loss:

Cost Price, Selling Price, Profit or Gain, Loss

Section B: Yoga, Games and Meditation:

Module-1: Asana sitting postures and Karate, Asana lying in supine & prone position and karate, Surya Namaskar, Asana standing posture and Karate, Kriyas, Pranayam and Karate, Meditation and Karate, Meditative posture and Karate, Tratak, Kapalbhathi and Meditation.

Meditation and Stress Management, Meditation, Stretching and Self Defense. Meditation, Kicking and Punching of Karate. (Games and Sports will be evaluated on the basis of the participation and performance in different sports events that the students shall participate in).

Section C: Skill Development for Professionals-I

Module-1: Parts of speech: Introduction, Brief discussion of Parts of speech, noun, Kinds of Noun, Rules & Application. Pronoun, Examples, Rules & Application, Verb, Kinds of Verb, Rules & Application, Definition of Tense, Different types of Tenses, Examples, Rules & Application, Adjective, Kinds of Adjective, Rules & Application, Adverb, Kinds of Adverb, Rules & Application, Preposition, Examples, Rules & Application, Interjection, Examples, Rules & Its Application, Conjunction, Examples, Rules & Application, Articles, Examples, Rules & Application English Grammar.

Vocabulary- : Synonyms, Antonyms with examples, one word Substitution, Idioms & Phrases, Spotting Errors.

Reading Comprehension (Level I)

Module-2: Indian Constitution and Governance: Historical background (in brief) - The company Rule (1773-1858), the crown rule (1858-1947), making of constitutions, features of constitution. The Preamble-Ingredients, keywords, amendment of preamble. Part & schedule, Citizenship (in brief) - Constitutional provisions, Citizenship act, Comparing PIO & OCI card holders, Fundamental Rights- Concept & different articles, Right to equality, prohibition of discrimination on certain ground, Equality of opportunity, abolition of untouchability & titles, right to freedom, right to education, right against exploitation, right to freedom of religion, cultural & educational rights, different writs & scopes, DPSP-Classification of directive principle, sanctioned of directive principle, criticism, Distinction between fundamental rights & directive principle List of Fundamental duties, criticism, significance, Verma committee. Features of parliament govt. Features of Presidential Govt. Merits & Demerits. Duties of Honorable President & Vice President & their selection, Provision & scopes, Duties of PM, CM & Governor & their selections

Module-3: Data Interpretation Level-I

Newspaper reading: The Hindu & Economic Times

Text Books

1. Quantitative Aptitude for Competitive Examinations by R S Aggarwal
2. Introduction to the Constitution of India, by D D Basu
3. The Constitution of India by Dr. B.R. Ambedkar Under Chairmanship of Dr. Rajendra Prasad Including Coloured Preamble, Signatures

References

1. The Constitution of India by Dr. B.R. Ambedkar 2020.

TITLE OF COURSE: Design Thinking & Innovation-I

COURSE CODE: HSM181

L-T-P: 0-0-1

CREDITS: 0.5

Pre-requisite: Mathematics and Basics of C programming language and will be useful to understand innovation and its applications in different areas of development and growth.

Introduction:

The course titled Design Thinking & Innovations is designed to give an in-depth understanding on various aspects of thinking, innovations, creativity, evolving business models, incubation and entrepreneurship.

Course Outcomes (CO):

CO1: The course also includes sessions on Engineering and Technology incubation which will help everyone as a game changer in nowadays competitive scenario.

CO2: The students are able to empathize with a broad group of stakeholders to understand their needs through the ethnographic method.

CO3: The students are able to define and re-define innovation challenges by asking the right questions, and not necessarily focusing on the right answers.

CO4: The students are able to develop many creative ideas through structured brainstorming sessions.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓		✓		✓
CO2		✓				✓		✓		✓		✓
CO3	✓											✓
CO4			✓						✓	✓		✓

Course Contents:

Module 1: Introduction to Design thinking

Module 2: Empathy: Problem Discovery & Evoking the ‘right problem’

Module 3: Research and Analysis: Context Research and Design Insights and Strategy

Module 4: Solve: Concepting and Building – Generating Ideas, Building Ideas and Create a Concept

Module 5: Testing, Refine and Enhance Design

Module 6: Workshop: Case studies

- Computer Science Related problems
- Mechanical Engineering problem
- Electrical Engineering problem
- Electronics Engineering problem

Text Books

1. Kelley, D. & Kelley, T. (2014). Creative Confidence: Unleashing the Creative Potential Within Us All. New York: William Collins.
2. Roth, B. (2015). The Achievement Habit: Stop Wishing, Start Doing, and Take Command of Your Life. HarperBusiness.

References

1. <https://nptel.ac.in/courses/110/106/110106124/>
2. <https://nptel.ac.in/courses/109/104/109104109/>

Second Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	BSC	BSC204	Mathematics-II	3	1	0	4
2.	BSC	BSC205	Statistics-II	3	1	0	4
3.	ESC	ECC202	Principal of Electronics Engineering	3	0	2	4
4.	CC	CBC202	Data Structure & Problem Solving	3	0	2	4
5.	CC	CBC203	Fundamentals of Economics	3	0	2	4
6.	HSM	HSM202	Business Communication & Value Science-II	2	0	2	3
7.	GSC	GSC202	ESP & SDP-II	2	0	0	2
8.	NPT	NPT201	(NPTEL/MOOCs)	-	-	-	2
9.	HSM	HSM282	Design Thinking & Innovation-II	0	0	1	0.5
Total				19	2	12	28.5/33

(NPT201): NPTEL courses are based on the respective year's offered courses

TITLE OF COURSE: MATHEMATICS-II

COURSE CODE: BSC204

L-T-P: 3-1-0

CREDITS: 4

Pre-requisites: The students should have basic Knowledge of high school math, Boolean algebra and calculus.

Introduction:

To develop ability to use the mathematical techniques, skills, and tools necessary for computer science.

Course Outcomes:

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

CO1: Apply knowledge of basics of Matrices, Determinants.

CO2: Solve the consistency of any type of systems

CO3: Describe Vector space, Orthogonality and Projection.

CO4: Apply methods Gram-Schmidt orthogonalization and QR decomposition.

CO5: Calculate Eigenvalues and Eigenvectors.

CO6: Describe Singular value decomposition and Principal component analysis.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓						✓			✓
CO2	✓			✓	✓							
CO3		✓							✓			✓
CO4	✓	✓		✓					✓			✓
CO5		✓	✓						✓			✓
CO6		✓	✓						✓			✓

Course Contents:

MODULE – I

Introduction to Matrices and Determinants, Solution of Linear Equations, Cramer's rule, Inverse of a Matrix.

MODULE – II

Vectors and linear combinations, Rank of a matrix, Gaussian elimination, LU Decomposition, Solving Systems of Linear Equations using the tools of Matrices.

MODULE – III

Vector space, Dimension, Basis, Orthogonality, Projection.

MODULE – IV

Gram-Schmidt orthogonalization and QR decomposition.

MODULE – V

Eigenvalues and Eigenvectors, Positive definite matrices, Linear transformations, Hermitian and Moduleary matrices.

MODULE – VI

Singular value decomposition and Principal component analysis, Introduction to their applications in Image Processing and Machine Learning.

Home Assignments:

Assignments & tutorials covering the following: Vectors and linear combinations, Matrices, Determinants, Linear transformations, Complete solution to $AX=b$, Eigenvalues and Eigenvectors.

Text Book:

1. B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publication, Delhi.

Reference Books:

1. Advanced Engineering Mathematics, 7e, by Peter V. O’Neil.
2. Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education.
3. Introduction to linear algebra, 5th Edition, Gilbert Strang.
4. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5. Digital Image Processing, R C Gonzalez and R E Woods.

TITLE OF COURSE: STATISTICS-II

COURSE CODE: BSC205

L-T-P: 3-1-0

CREDITS: 4

Pre-requisites: Basic of statistics and probability, Basic programming experience (in any language)

Course Objective:

The course introduces fundamental concepts of linear statistical models, estimation methods, hypothesis testing and fundamental concepts of programming in R

Course Outcomes:

The students completing this course will be able to

- CO1.** Understand the basic concepts of Statistical Inference,
- CO2.** Understand the basic concepts of Estimation methods,
- CO3.** Understand the basic concepts of Hypothesis Testing
- CO4.** Understand the basic concepts of linear statistical models.
- CO5.** Understand Introductory R language fundamentals, basic syntax and how to use R; what R is and how it’s used to perform data analysis;
- CO6.** Understand major R data structures and create visualizations using R.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓						✓			✓
CO2	✓			✓	✓							
CO3		✓							✓			✓

CO4	✓	✓		✓					✓			✓
CO5		✓	✓						✓			✓
CO6		✓	✓						✓			✓

Course Contents:

MODULE – I

Linear Statistical Models: Simple linear regression & correlation, multiple regression & multiple correlation, Analysis of variance (one way, two way with as well as without interaction)

MODULE – II

Estimation: Point estimation, criteria for good estimates (unbiasedness, consistency), Methods of estimation including maximum likelihood estimation.

MODULE – III

Sufficient Statistic: concept & examples, complete sufficiency, their application in estimation

MODULE – IV

Test of hypothesis: concept & formulation, type I and type II errors, Neyman Pearson lemma, Procedures of testing

MODULE – V

Non-parametric Inference: Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region

Basics of Time Series Analysis & Forecasting: Stationary, ARIMA Models: Identification, Estimation and Forecasting.

MODULE – VI

R statistical programming language: Introduction to R, Functions, Control flow and Loops, Working with Vectors and Matrices, Reading in Data, Writing Data, Working with Data, Manipulating Data, Simulation, Linear model, Graphics in R

Home Assignments:

Problem sets to be shared by faculty covering the following topics:

Estimation Methods: Parametric & Non – Parametric, Hypothesis Testing

Text Books:

1. Probability and Statistics for Engineers (4th Edition) - I.R. Miller, J.E. Freund and R. Johnson.
2. Fundamentals of Statistics (vol. I and vol. II) - A. Goon, M. Gupta and B. Dasgupta.
3. Hands-on Programming with R - Garrett Grolmund
4. R for Everyone: Advanced Analytics and Graphics - Jared P. Lander

Reference Books:

1. Statistical Theory with Engineering Application - A. Hald.
2. Statistical Methods - G.W. Snedecor and W.G. Cochran.
3. Statistical Concepts & Methods - G.K. Bhattacharyya and R.A. Johnson.
4. Introduction to Linear Regression Analysis - D.C. Montgomery & E. Peck
5. Introduction to the Theory of Statistics - A.M. Mood, F.A. Graybill & D.C. Boes.
6. Practical Non-Parametric Statistics - W.J. Conover

TITLE OF COURSE: PRINCIPLES OF ELECTRONICS ENGINEERING

COURSE CODE: ECC202

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: The students should have knowledge of Class XII level Electronics, Physics & Mathematics

Introduction:

The course introduces fundamental concepts of electronics.

Course Outcomes:

Students will be able to,

CO1. Identify semiconductor materials, draw band-diagrams, and distinguish between intrinsic and extrinsic semiconductors.

CO2. Explain the phenomenon of rectification, draw the I-V characteristics and calculate ripple factor.

CO3. Explain the I-V characteristics of BJTs – both input and output; learn to bias transistors as an amplifier.

CO4. Describe FET and MOSFET and differentiate between BJT, FET and MOSFET.

CO5. Explain the fundamentals of feedback amplifiers and Operational Amplifier.

CO6. Demonstrate the knowledge of Boolean algebra including simplification techniques and operation of basic types of flip-flops.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓						✓			
CO2	✓	✓	✓						✓			
CO3	✓	✓	✓		✓				✓			
CO4	✓	✓							✓			
CO5	✓								✓			
CO6	✓	✓	✓		✓				✓			

Course Contents:

MODULE – I

Semiconductors: Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors & Insulators: electrical properties, band diagrams. Semiconductors: intrinsic & extrinsic, energy band diagram, P&N-type semiconductors, drift & diffusion carriers.

MODULE – II

Diodes and Diode Circuits: Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance. Linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

MODULE – III

Bipolar Junction Transistors: Formation of PNP / NPN junctions; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor

MODULE – IV

Field Effect Transistors: Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles

MODULE – V

Feed Back Amplifier, and Operational Amplifiers: Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability. Introduction to integrated circuits, operational amplifier and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator

MODULE – VI

Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters.

List of Experiments:

1. To plot V-I characteristics of PN junction diode.
2. To plot regulation characteristics of half wave rectifier
3. To plot regulation characteristics of Full wave rectifier
4. To plot input-output characteristics of CE configuration of BJT.
5. To study Biasing techniques of BJT- to find stability factor of self bias, collector to base bias, fixed bias circuits.
6. To plot frequency response of single stage FET amplifier (CS/CD configuration) and find its bandwidth.
7. To study Colpitts Oscillator.
8. Study of OP-AMP circuits: Inverting and Non-inverting Amplifier.
9. Study of basic logic gates and De-Morgan's Theorem.
10. Study of half adder and full adder.

List of Assignments: -

1. Describe applications of diodes as Clippers and Clampers.
2. Describe application of Zener diode as Voltage regulator.
3. Study of characteristic curves for CB configuration of BJT using Virtual Lab.
4. Simulation of BJT amplifier using Virtual Lab.
5. Design and Implementation of Various Arithmetic Circuits using Virtual Lab.
6. To design, built and test any electronic circuit (Group activity)

Text Books:

1. Sedra & Smith: Microelectronics Engineering
2. Millman & Halkias: Integrated Electronics

Reference Books:

1. Electronic Devices and Circuit Theory by Robert Boylestad

2. Solid State Electronic Devices by Streetman, Banerjee
3. Malvino: Electronic Principle
4. Schilling & Belove: Electronics Circuits
5. Millman & Grabal: Microelectronics
6. Salivahanan: Electronics Devices & Circuits
7. Boylestad & Nashelsky: Electronic Devices & Circuit Theory

TITLE OF COURSE: PRINCIPLES OF ELECTRONICS ENGINEERING LAB

COURSE CODE: ECC292

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Students studying basic electronics need experience with math courses, such as geometry, physics and algebra. Students learn how to use scientific calculators and formulas that help with figuring out voltage, distribution, and other circuit formulas.

Introduction:

This course is suitable for engineers in academia. The purpose of this course is to provide the student with precise theoretical and practical up to date knowledge of Basic Electronics and it's applications in day- to-day life. This course enhances the instructional capabilities of a student. This course is devoted to fundamental theory and recent developments addressing the related theoretical and practical aspects on electronic devices-their characteristics and applications.

Course Outcomes (CO):

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

CO1: Analyze and appreciate the working of electronic circuits involving applications of diodes.

CO2: Comprehend working of amplifiers.

CO3: Analyze and appreciate the working of electronic circuits involving applications of transistors.

CO4: Develop simple projects based on the different devices studied in this course.

CO5: There are so many applications of semiconductor devices in modern electronics. They are being used in manufacturing computers, in space research, in medical sciences and so on.

CO6: Rectifying a voltage, such as turning AC into DC voltages

CO7: Voltage Reference.

CO8: There are various kinds of transistors; there applications are also in diverse fields. They can be used in manufacturing logic gates which are the basis of the design of digital circuits.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓								
CO2	✓			✓								
CO3	✓		✓	✓								
CO4	✓		✓	✓								
CO5	✓	✓	✓	✓	✓	✓						✓
CO6	✓			✓								

CO7	✓					✓						
CO8	✓	✓	✓		✓							✓

Course Contents:

Module 1: Laboratory Sessions covering, Identification, Specifications, Testing of R, L, C Components (Colour Codes), Bread Boards and Printed Circuit Boards (PCBs); Identification, Specifications, Testing of Active Devices – Diodes, BJTs, JFETs, MOSFETs, Power Transistors and LEDs;

Module 2: Study and Operation of Digital Multi Meter, Function / Signal Generator, Regulated Power Supply (RPS), Cathode Ray Oscilloscopes; Amplitude, Phase and Frequency of Sinusoidal Signals using Lissajous Patterns on CRO;

Module 3: Experimental Verification of PN Junction Diode Characteristics in A) Forward Bias B) Reverse Bias, Zener Diode Characteristics and Zener Diode as Voltage Regulator, Input and Output Characteristics of BJT in Common Emitter (CE) Configuration, Drain and Transfer Characteristics of JFET in Common Source (CS) Configuration;

Module 4: Study of Half Wave and Full Wave Rectification, Regulation with Filters, Gain and Bandwidth of BJT Common Emitter (CE) Amplifier;

Module 5: Op-Amp Applications – Inverting and Non-inverting amplifier, Adder, Subtractor, Voltage Follower and Comparator, Differentiator and Integrator;

Module 6: Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR

Text Books

1. Salivahanan: Electronics Devices & Circuits; Chapter: 1-8
2. JB Gupta: electronic devices and circuits.
3. Rakshit Chattopadhyay: Electronics Fundamentals and Applications; Chapter: 1-8

References

1. Boylestad & Nashelsky : Electronic Devices & Circuit Theory
2. Malvino: Electronic Principle

TITLE OF COURSE: DATA STRUCTURES & PROBLEM SOLVING

COURSE CODE: CBC202

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: Students should have knowledge of Fundamentals of data types and programming concepts

Introduction:

The course is aimed to provide an understanding of key concepts underlying the choice and implementation of data structures, algorithms and step by step approach in solving problems with the help of these fundamental data structures.

Course Outcomes:

Students will be able to:

CO1. Understand the fundamentals and analysis of algorithms

CO2. Understand and implement linear data structures

CO3. Understand and implement Non Linear data structure of Trees.

CO4. Understand and implement Non Linear data structure of Graphs.

CO5. Understand and implement the.

CO6. Understand the concepts of distributed system security.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓				✓	✓		✓
CO2	✓	✓	✓	✓	✓				✓	✓		✓
CO3	✓	✓	✓	✓	✓				✓	✓		✓
CO4	✓	✓	✓	✓	✓				✓	✓		✓
CO5	✓	✓	✓	✓	✓				✓	✓		✓
CO6	✓	✓		✓	✓				✓			

Course Contents:

MODULE – I

Basic Terminologies & Introduction to Algorithm and Data Organization: Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction

MODULE – II

Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures

MODULE – III

Non-linear Data Structure Trees Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, and Splay Tree), Various Representations, Operations: search and traversal algorithms and complexity analysis Applications of Trees.

MODULE – IV

Non-linear Data Structure Graphs: Graphs: Directed and Undirected, Various Representations Operations: Search and traversal algorithms and complexity analysis Applications of Graphs.

MODULE – V

Searching and Sorting: Sequential Search, Binary Search, Breadth First Search, Depth First Search, Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap Sort, Introduction to Hashing

MODULE – VI

File: Organisation (Sequential, Direct, Indexed Sequential, and Hashed) and various types of accessing schemes

Home Assignments:

1. Towers of Hanoi using user defined stacks.
2. Reading, writing, and addition of polynomials.
3. Line editors with line count, word count showing on the screen.
4. Trees with all operations.
5. All graph algorithms.
6. Saving / retrieving non-linear data structure in/from a file

Text Books:

1. Fundamentals of Data Structures, E. Horowitz and S. Sahni, 1977
2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman

Reference Books:

1. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth
2. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
3. Open Data Structures: An Introduction (Open Paths to Enriched Learning)), 31st ed. Edition, Pat Morin

TITLE OF COURSE: DATA STRUCTURES & PROBLEM SOLVING LAB

COURSE CODE: CBC292

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Basic concepts in mathematics and programming languages.

Introduction:

This course examines data structures and algorithms basics using python. The Topics to be covered (tentatively) include: an introduction to programming and problem solving in Python with basic concepts such as conditionals, loops, functions, lists, strings and tuples; Time and space analysis of algorithms; Linear Data structures like array, linked list, stack, queue; Non-linear Data structures like graph and tree; Sorting; Searching and Hashing.

Course Outcomes (CO):

In this course we will study the basic components of data structure and algorithm. Students are expected to be capable of understanding the data structures, their advantages and drawbacks, how to implement them in python, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to design & implement any data structure properly.

CO2: Students would be able to implement any problem by writing their own algorithm.

CO3: By analyzing the logic of any algorithm, students would be able to write efficient program.

CO4: To become an efficient programmer

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓

CO4	✓	✓	✓		✓							✓
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Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Implementation of array operations

Exercise No. 2: Stacks and Queues: adding, deleting elements

Exercise No. 3: Circular Queue: Adding & deleting elements

Exercise No. 4: Merging Problem: Evaluation of expressions operations on multiple stacks & queues

Exercise No. 5: Implementation of linked lists: inserting, deleting, and inverting a linked list.

Exercise No. 6: Implementation of stacks & queues using linked lists, Polynomial addition, and Polynomial multiplication

Exercise No. 7: Sparse Matrices: Multiplication, addition.

Exercise No. 8: Recursive and Non-recursive traversal of Trees

Exercise No. 9: Threaded binary tree traversal. AVL tree implementation

Exercise No. 10: Application of Trees. Application of sorting and searching algorithms

Text Books

1. Data Structures and Algorithms in Python: Michael H. Goldwasser, Roberto Tamassia, Michael T. Goodrich, Publisher: John Wiley & Sons

2. Data Structure and Algorithmic Thinking with Python: Narasimha Karumanchi; Careermonk publication.

References

1. Problem Solving in Data Structures & Algorithms Using Python: Programming Interview Guide:Hemant Jain; Createspace Independent Pub

2. Data Structures and Algorithms Using Python: Necaie Rance D; Wiley publisher

TITLE OF COURSE: FUNDAMENTALS OF ECONOMICS

COURSE CODE: CBC203

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: Knowledge of Class XII level Mathematics

Introduction:

1. To impart knowledge, with respect to concepts, principles of Economics, which govern the functioning of a firm/organization

2. To explain the students about concept of production, cost, national income, an aggregate supply and aggregate demand consumption

Course Outcomes:

After completing this course, students should be able to:

CO1. Demonstrate an understanding of the methods and principles of microeconomic and macroeconomic theory, including trade-offs, oport Moduley costs, and marginal decision making.

CO2. Explain how markets work and how market prices are determined using principles of supply and demand.

CO3. Assess the impact of market failure such as externalities, and public goods and evaluate possible public policy remedies.

CO4. Analyse financial markets and investments, including the stock market, and their relation to the economy.

CO5. Evaluate key economic indicators (including GDP, unemployment, inflation) and their use in evaluating macroeconomic conditions.

CO6. Understand major macroeconomic tools, including fiscal and monetary policies, and their use in managing the economy. Also apply ethical principles in a variety of economic contexts.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓										
CO2	✓	✓										
CO3	✓											
CO4	✓	✓										
CO5	✓		✓									
CO6												

Course Contents:

MODULE – I

Microeconomics

Principles of Demand and Supply – Supply Curves of Firms – Elasticity of Supply Demand Curves of Households – Elasticity of Demand Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve) Welfare Analysis – Consumers’ and Producers’ Surplus – Price Ceilings and Price Floors

MODULE – II

Consumer Behaviour – Axioms of Choice – Budget Constraints and Indifference Curves Consumer’s Equilibrium – Effects of a Price Change, Income and Substitution Effects – Derivation of a Demand Curve Applications – Tax and Subsidies – Intertemporal Consumption – Suppliers’ Income Effect

MODULE – III Theory of Production – Production Function and Iso-quants – Cost Minimization, Cost Curves – Total, Average and Marginal Costs – Long Run and Short Run Costs Equilibrium of a Firm Under Perfect Competition Monopoly and Monopolistic Competition

MODULE – IV

Macroeconomics

National Income and its Components – GNP, NNP, GDP, NDP Consumption Function Investment Simple Keynesian Model of Income Determination and the Keynesian Multiplier Government Sector – Taxes and Subsidies External Sector – Exports and Imports

MODULE – V

Money – Definitions

Demand for Money – Transactionary and Speculative Demand

Supply of Money – Bank’s Credit Creation Multiplier

Integrating Money and Commodity Markets – IS, LM Model

Business Cycles and Stabilization – Monetary and Fiscal Policy – Central Bank and the Government

MODULE – VI

The Classical Paradigm – Price and Wage Rigidities – Voluntary and Involuntary Unemployment.

Home Assignments:

In the discussion topics mentioned above, students should be asked to prepare in advance in groups and present in class

Text Books:

1. Microeconomics- Pindyck, Robert S., and Daniel L. Rubinfeld Microeconomics
2. Macroeconomics- Dornbusch, Fischer and Startz

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE - II

COURSE CODE: HSM202

L-T-P: 2-0-2

CREDITS: 3

Pre-Requisites:

1. Basic knowledge of the parts of speech in English.
2. Vocabulary covered in the previous semester along with basic knowledge of verbs & adverbs.
3. Basic awareness of the need of speaking skills within social circle.
4. The elements of team dynamics done during the previous semester with proper application.
5. Basic awareness of the concepts of feedback, criticism.
6. The various common conflicts that may arise at varied situations.

Introduction:

The course aims to augment students overall communication and interpersonal skills by engaging them in group activities and thus aid in helping them to emerge as professionals. The soft skills topics for this semester are intended to develop student's expertise on public speaking skills and to deal positively with criticism and so as to effectively present their personalities

Course Outcomes:

By the end of the course, students should be able to

CO1. Speak fluently in English without errors in the sentence construction and hence present themselves as effective English communicators. They will be able to learn 20-25 common errors made in parts of speech and also use 10 modal verbs efficiently during professional communication.

CO2. Differentiate between vocabulary used as adjectives, verbs and adverbs and be able to use the 60-70 words for their daily conversation.

CO3. Overcome the fear of speaking and will be aware of the 3 types of public speaking necessary according to the contemporary requirements. They would be able to deliver a public speech according to the need of the audience and also be aware of positive body language to be manifested during a speech.

CO4. Deal with the deeper parameters of working in teams like team motivation, multicultural team activity and team conflict resolution.

CO5. Analyze them relating to their hobbies and strengths and hence set realistic goals in terms of personal and professional growth. They will be able to identify at least 5-7 strengths and a couple of goals to be achieved that will enable their lives to be directed appropriately.

CO6. Apply 5-6 positive strategies to diversity and inclusion during team work.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO1	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓			✓	✓	✓			✓	✓	✓
CO3	✓	✓			✓	✓				✓	✓	✓
CO4	✓	✓			✓	✓				✓	✓	✓
CO5	✓	✓	✓		✓	✓				✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Course Contents:

MODULE – I

Essential Grammar – II: Application of tenses, Auxiliaries- correct usage and importance in formal communication, Business Vocabulary - Vocabulary exercises through web-based applications

MODULE – II

Written Communication II: Email writing- Formal and Informal email writing structure, Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales Letters etc. Technical writing, Essay writing, Paragraph writing.

MODULE – III

Vocabulary- II: Vocabulary exercises through web-based applications, Usage and application through mock meetings

Situational Conversation: Application of grammar and correct spoken English according to context/ situation and application in business scenario.

MODULE – IV

Fundamentals of Effective Communication: Public Speaking: fundamentals of effective public speaking, types- Extempore speech, manuscript speech, and ways to enhance public speaking skills, storytelling, oral review

Presentation Skills: PowerPoint presentations, Effective ways to structure the presentation, importance of body language

Leadership Skills, Leader's Role, Responsibilities And Skill Required: Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback.

Problem Solving Skill: Problem solving skill, Confidence building

MODULE – V

Corporate / Business Etiquettes: Corporate grooming & dressing, etiquettes in social & office Setting- Understand the importance of professional behavior at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities

MODULE – VI

Diversity and Inclusion Part II: Socio-Cultural and Cross-Cultural Sensitivities at the Workplace: PwD and LGBT at the workplace, Learning disabilities at the workplace; Caste, class, regionalism, religion and poverty: the different identities of Indian employees and employers and how to include everyone; Global diversity identities of race, religion, nationhood; Appropriate Social Media Use

Values Sciences Part II: Values of a good manager: Ethics in Business; Embodying organizational pride with grace

Text Books:

1. Business Communication Today by Bovee, Thill, Raina
2. APAART: Speak Well 1 (English Language and Communication)
3. APAART: Speak Well 2 (Soft Skills)

Reference Books:

1. Strategic Communication by Charles Marsh
2. English vocabulary in use – Alan Mc'Carthy and O'dell
3. Business Communication – Dr. Saroj Hiremath

TITLE OF COURSE: ESP & SDP-II

COURSE CODE: GSC202

L-T-P: 2-0-2

CREDITS: 2

Pre-requisite: Basic concepts in mathematics, English

Introduction:

The Topics will be covered (tentatively): Aptitude, Indian Constitution and Governance, Basic English and Data Interpretation.

Course Outcomes (CO):

Students are expected to be capable numerical problems, literature, and basic of Indian constitution. To reach this goal, the following objectives need to be met:

CO1: Students would be able to design & implement any basic numerical problem properly.

CO2: Students would be able to know basic English language and communicate with the society.

CO3: Students would be able to know basic Indian constitution.

CO4: Students would be able to stress management by doing Yoga

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Essential Studies for Professionals-II

Section-A: Employment Enhancement Skills

Module 1: Ratio and Proportion

Ratio, Proportion, Proportional, Comparison of Ratios, Compounded Ratios, Duplicate Ratio, Triplicate Ratio, Variation.

Module 2: Time, Work and Distance

Module 3: Alligation or Mixture

Alligation, Mean price, Rule of Alligation

Module 4: Clocks and

Clocks, Odd days, Leap Year, Ordinary year, Counting of odd days, Day of the week related to odd days.

Module 5: Permutations and Combinations

Factorial n, Permutations, Combinations.

Module-6: Logical Reasoning

1) Cube Dice, Miscellaneous Problems

2) Data Sufficiency

a) Problems on Blood Relation, ages, Numbers b) Logical Test Based on Data Sufficiency

3) Non Verbal Reasoning

a) Image Formation b) Water –Images c) Mirror Image

d) Image completion

e) Paper Cutting and Folding

Section B: Yoga, Games and Meditation

Module-1: Asana sitting postures and Karate, Asana lying in supine & prone position and karate, Surya Namaskar, Asana standing posture and Karate, Kriyas, Pranayam and Karate, Meditation and Karate, Meditative posture and Karate, Tratak, Kapalbhathi and Meditation.

Meditation and Stress Management, Meditation, Stretching and Self Defense. Meditation, Kicking and Punching of Karate. (Games and Sports will be evaluated on the basis of the participation and performance in different sports events that the students shall participate in).

Section C: Skill Development for Professionals -II

Course Contents:

Module-1: Listening

Listening to stories, newspaper articles, Oral Comprehension, Dialogue/ Conversation

Module-2: Speaking

Group discussion, debate, Oral Presentation, Just A Minute (JAM)

Language Function Permission – Request, Order

Practice of Phonetics, Pronunciation, Voice modulation, Accent and voice through passage reading

Story-telling, Role play model (telephonic conversation, situation)

Module-3: Reading Comprehension

Read and analyze through passages, diagrams, graphics, technical and non-technical passages

Learn to read Global, inferential, Contextual Comprehension.

Story writing, Passage writing, Essay writing, Rearranging Jumbled Sentences, Word formation: Prefixes and Suffixes, Homonyms and Homophones, Question and Answer – Comprehension Passages.

Module-4: Indian Constitution and Governance

Central State relation, Interstate relation,

Supreme Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Adhoc Judge, Procedure of the court, write jurisdiction, Power of Judicial review.

High Court-Appointment of Chief Justice, Acting Chief Justice, Qualification, Oath or Affirmation, Tenure of Judge, Removal of Judges, Salaries & allowance, Adhoc Judge, Procedure of the court, write jurisdiction, Power of Judicial review

Duties & Powers of **Attorney & Advocate General** (in brief)

Panchayati Raj- Three tier system, Different committees recommendation

Municipality, Municipal Council & Corporation, Official Languages & related Articles.

UPSC (in brief): Formation, Related Articles, Scope & Power, Duties of **CAG**, Formation **SPSC**, Related Articles, Scope & Power.

Election Commission (in brief) - Related Articles, Power & Function & Provision of Election

Emergency Provisions (in brief)- Related Articles, Conditions Application, Supreme power during emergency.

National Commission for SC/ST/OBC (in brief): Function of the commissions, Special offer & related articles for SC/ST/OBC

Different amendments (in brief) of Indian Constitution & the related articles

Module-5: Data Interpretation level-II

Newspaper reading: The Hindu & Economic Times

Text Books

1. Quantitative Aptitude for Competitive Examinations by R S Aggarwal
2. Introduction to the Constitution of India, by D D Basu
3. The Constitution of India by Dr. B.R. Ambedkar Under Chairmanship of Dr. Rajendra Prasad Including Coloured Preamble, Signatures

References

1. The Constitution of India by Dr. B.R. Ambedkar 2020

TITLE OF COURSE: Design Thinking & Innovation-II

COURSE CODE: HSM282

L-T-P: 0-0-1

CREDITS: 0.5

Pre-requisite: As the course is designed for B. Tech 1st year students therefore this course does not require any prerequisite knowledge except Discrete Mathematics, C programming language, Data Structures and will be useful to understand innovation and its applications in different areas of development and growth.

Introduction:

The course titled Design Thinking & Innovations is designed to give an in-depth understanding on various aspects of thinking, innovations, creativity, evolving business models, incubation and entrepreneurship. The course also includes sessions on Engineering and Technology incubation which will help everyone as a game changer in nowadays competitive scenario.

Course Outcomes (CO):

CO1: The students know how to approach innovation challenges from a human-centered perspective.

CO2: They understand that the best innovations are usually the ones that address deep human needs which point to meaning and the human experience.

CO3: They acknowledge that a multidisciplinary approach to innovation is a powerful way to incorporate the perspectives of many different kinds of people, and that diversity is key to the development of continuous, and radical innovations

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓				✓		✓
CO2										✓		✓
CO3										✓		✓

Course Contents:

Module 1: Introduction to Design Thinking (Recapitulation)

Module 2: Empathy: Problem Discovery & evoking the ‘right problem’ (Advanced topics)

Module 3: Research and Analysis: Context Research and Design Insights and Strategy (Advanced topics)

Module 4: Solve: Concepting and Building – Generating Ideas, Building Ideas and Create a Concept (Advanced topics)

Module 5: Testing, Refine and Enhance Design and Define pitch (Advanced topics)

Module 6: Workshop: Case studies

- Algorithm related to Facebook
- Evolution of Algorithms for fundamental Mathematical & Statistical operations
- Algorithm related to digital electronics problem

Text Books

1. Kelley, D. & Kelley, T. (2014). Creative Confidence: Unleashing the Creative Potential within Us All. New York: William Collins.
2. Roth, B. (2015). The Achievement Habit: Stop Wishing, Start Doing, and Take Command of Your Life. Harper Business.
3. Roger, M. (2013). The Design of Business: Why Design Thinking is the Next Competitive Advantage. Boston: Harvard Business Review Press.

References

1. <https://nptel.ac.in/courses/110/106/110106124/>
2. <https://nptel.ac.in/courses/109104109/>

Third Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	CC	CBC304	Mathematics-III: Discrete Mathematics	3	1	0	4
2.	CC	CBC305	Formal Language and Automata Theory	3	0	2	4
3.	CC	CBC306	Software Engineering	3	0	2	4
4.	OE/DE	---	Discipline Specific Elective	3	0	2	4
5.	DE	---	Generic Specific Elective	3	0	2	4
6.	HSM	HSM---	Business Communication & Value Science-III	3	0	0	3
7.	GSC	GSC303	ESP & SDP - III	2	0	0	2
8.	MC	MC301	Environmental Science	0	0	0	0
9.	NPT	NPT302	(NPTEL/MOOCs)	-	-	-	2
10.	PTI	INT301	Self-Learning Module /Project-I	0	0	2	1
11.	MAR	MAR383	Mandatory Additional Requirements (MAR)	0	0	1	0.5
Total				20	1	11	28.5/31

##(NPT302): NPTEL courses are based on the respective year's offered courses

Suggestive Choice Based Subjects

Sl No	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CBD301	Computer Organization and Architecture	3	0	2	4
2.	OE	ECC306	Digital System Design & Computer Organization	3	0	2	4
3.	DE	CBD302	Advanced Programming with Python	3	0	2	4
4.	DE	CBD303	Object Oriented Programming Using C++/Java	3	0	2	4
5.	HSM	HSM304	Industrial Psychology	3	0	0	3
6.	HSM	HSM305	Values and Ethics in Profession	3	0	0	3

**TITLE OF COURSE: DISCRETE MATHEMATICS****COURSE CODE: CBC304****L-T-P: 3-1-0****CREDITS: 4****Pre-requisites:** Students should have knowledge of Mathematics**Introduction:**

To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.

Course Outcomes:

The students will learn:

CO1. Write an argument using logical notation and determine if the argument is or is not valid.

CO2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.

CO3. Understand the basic principles of sets and operations in sets.

CO4. Prove basic set equalities.

CO5. Apply counting principles to determine probabilities.

CO6. Demonstrate an understanding of relations and functions and be able to determine their properties.

CO7. Demonstrate different traversal methods for trees and graphs.

CO8. Model problems in Computer Science using graphs and trees.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓						✓	✓		✓
CO2	✓	✓							✓			✓
CO3	✓	✓		✓	✓				✓			✓
CO4	✓	✓			✓				✓			✓
CO5	✓	✓		✓					✓			✓
CO6	✓	✓							✓			✓
CO7	✓	✓							✓			✓
CO8	✓	✓	✓						✓	✓		✓

Course Contains:**MODULE – I: Sets and Counting Techniques**

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition,

The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination, Disjunctive and Conjunctive Normal Form.

MODULE – II: Propositional Logic

Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by conditional.

MODULE – III: Algebraic Structures and Morphism

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation

MODULE – IV: Advanced Algebraic Structure and Boolean Algebra

Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function.

MODULE – V: Graphs and Trees

Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, chromatic number, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distance methods.

MODULE – VI: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems.

Text Books:

1. Satya narayana & shyam Prasad :discrete mathematics and graph theory, PHI
2. Kishor shinde: Discrete Structure, Everest publishing house
3. Hari Parihar&Ritu Agarwal, discrete mathematical structures, ashirwad

TITLE OF COURSE: FORMAL LANGUAGE & AUTOMATA THEORY

COURSE CODE: CBC305

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Knowledge is also assumed of basic concepts in mathematics like set theory.

Introduction:

This course introduces the formal language & automata theory. Starting with the most primitive computing device, a finite automaton, the course gradually introduces additional components to the device to enhance its computing power. The course also introduces students to the twin concepts of languages and grammars that correspond to classes of computing devices. Finally the course introduces the idea of a universal computing device and brings out theoretical limits of the very idea of computing.

Course Outcomes:

CO1. To distinguish between computing and other kinds of machines.

CO2. To define a system, recognize the behavior of a system and to minimize, compare it with different systems.

CO3. To relate computing problems to machines, languages and grammars.

CO4. To construct regular expressions and grammars.

CO5. To design deterministic and nondeterministic automata and Turing machines.

CO6. To convert grammars to normal forms and eliminate ambiguities.

CO7. To recognize unsolvable problems and limitations of computing.

CO8. To prove theorems by deduction, induction and contradiction.

CO9. Get familiarity with the seminal works of Turing and Chomsky.

Application:

1. To design the sequence detector, with or without output finite machine.
2. To design the deterministic and non-deterministic PDA.
3. To design the Turing machine

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓							✓	✓		✓
CO2	✓	✓	✓	✓					✓	✓		✓
CO3	✓	✓	✓	✓	✓				✓	✓		✓
CO4	✓	✓	✓	✓	✓				✓	✓		✓
CO5	✓	✓							✓	✓		✓
CO6	✓	✓							✓	✓		✓
CO7	✓	✓	✓	✓	✓				✓	✓		✓
CO8	✓	✓							✓	✓		✓
CO9	✓	✓							✓	✓		✓

Course Contents:

MODULE – I: Introduction to Finite State Model and Sequential circuit, design of Sequence detector and introduction to Finite State Machine. Finite Automata: introduction, types, application and limitations.

MODULE – II: Regular language and grammar – definition of RE, rules, closure properties, Constructing FA to RE and vice versa, Pumping lemma of regular sets.

MODULE – III: Context free language and grammar - definition of CFL, closure properties, Pumping lemma and Ogden's lemma of CFL, Pushdown Automata: definition, type, constructing PDA to CFL and vice versa.

MODULE – IV: Turing Machine: definition, construction, types of TM. Concepts of Universal Turing machine and Halting problem.

Text Books

1. Mishra & Chandrashekar, "Theory of Computer Science, Automata Languages & computation", 2nd Edi. PHI.
2. Peter Linz, "Introduction to Formal Language and Automata", 5th Edi., Jones and Bartlett's Publications.
3. ZVI Kowhai, "Switching & Finite Automata", 2nd edition, Tata McGraw Hill.

References

1. C.K. Nagpal, "Formal Languages and Automata Theory", Oxford.
2. Hopcroft H.E. & Ullman J. D, "Introduction to Automata Theory Language and Computation", Pearson Education.

TITLE OF COURSE: SOFTWARE ENGINEERING

COURSE CODE: CBC306

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: Knowledge is also assumed of basic concepts in data structures, programming languages, and computer architecture.

Introduction:

Software engineering concepts include the collection of tools, procedures, methodologies, and accumulated knowledge about the development and maintenance of software-based systems. This course is strongly suggested for any student planning to take an internship in Computer Science. After an overview of the phases of the software lifecycle, current methodologies, tools, and techniques being applied to each phase will be discussed in depth with localized exercises given to reinforce learning of concepts.

Course Outcomes:

This course will serve to broaden the student's understanding of the issues and latest developments in the area of software development and maintenance. To reach this goal, the following objectives need to be met:

CO1. Define the current state of software development and maintenance characterized as "the software crisis." and the multidimensional aspect of software engineering, which is the current best attempt at solving the software crisis.

CO2. Become familiar with popular models of the software development and maintenance process. and the waterfall model, study the inputs, outputs, and processes present in each phase.

CO3. Study the core concepts present in several popular methodologies and be able to identify strengths and weaknesses of each the requirement and design approach to develop a software product.

CO4. Study existing CASE tools to be able to identify opport Moduleies to automate tasks through the use of such tools and the testing techniques to develop an error free software product.

CO5. Briefly investigate problems present in project management and understand the estimation, techniques during a software development cycle and Consider the issues and techniques present in confidence gaining measures residing in each phase of the software lifecycle.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓									
CO2	✓	✓										
CO3	✓		✓		✓			✓				
CO4	✓	✓		✓		✓		✓			✓	✓
CO5	✓	✓										✓

Course Contents:

MODULE – I: Software Process Model: Introduction to Software engineering, The Software Crisis and Software Engineering, Software Process Models- A Model of Software Development.

MODULE – II: Requirement Analysis: Requirement Elicitation, Analysis, Specification, SRS, Formal system development techniques.

MODULE – III: Design: Data modeling, Functional modeling Software Architecture and Design: Data

design, Architectural Design Process, SADT, OOAD, TDD, BDD, MVC, function-oriented design, Design Patterns: Structural Patterns, Behavioral Patterns, and Creational Patterns.

MODULE – IV: UML: Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Event trace diagram.

MODULE – V: Software Testing: Top-Down and Bottom-up Approach, Verification and Validation, Structural testing, functional Testing, Testing Strategies, Test Case design.

MODULE – VI: Software Project Management: Estimating Size, Effort and Cost: Metric for Analysis, Metric for Design, COCOMO model, Putnam Model etc., Implementation and Integration: Coding standard and practices.

MODULE – VII: Software Maintenance: Types, Cost of Software, maintenance, Software Maintenance Models, CASE Tool Taxonomy: Business Process Engineering tool, Process modeling and management tool, project planning tool, requirement tracking tool, Metric and management tool, documentation tool, system software tool etc. Introduction to software engineering for web and mobile applications.

MODULE – VIII: Software Management Tools: TFS, JIRA, Rally, Devops

Text Books

1. Software Engineering: A practitioner's approach: Roger S. Pressman, McGraw- Hill Publications (Sixth Edition).
2. Fundamentals of Software Engineering: Mall, Rajib, Prentice Hall of India, New Delhi (2nd Edition).

References

1. Software Testing Techniques, B. Beizer.
2. Structured Systems Analysis: Tools and Techniques, Gane and Sarson.
3. Software Engineering, Sommerville, Addison Wesley.
4. Modern Structured Analysis, E.Yourdon.
5. An Integrated approach to Software Engineering: Pankaj Jalote, Narosa Publishing House.
6. Structured design, E. Yourdon and L.Constantine.

TITLE OF COURSE: SOFTWARE ENGINEERING LAB

COURSE CODE: CBC396

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Students must have already registered for the course, “Software Engineering”.

Objectives:

Students will be capable to acquire the generic software development skill through various stages of software life cycle. He will also be able to ensure the quality of software through software development with various protocol based environment.

Course Outcomes (CO):

This course will serve to broaden the student's understanding of the issues and latest developments in the area of software development and maintenance. To reach this goal, the following objectives need to be met:

CO1: Define the current state of software development and maintenance characterized as "the software crisis".

CO2: Understand the multidimensional aspect of software engineering, which is the current best attempt at solving the software crisis.

CO3: Become familiar with popular models of the software development and maintenance process.

CO4: Using the waterfall model, study the inputs, outputs, and processes present in each phase.

CO5: Study the core concepts present in several popular methodologies and be able to identify strengths and weaknesses of each.

CO6: Understand the requirement and design approach to develop a software product.

CO7: Study existing CASE tools to be able to identify opportunities to automate tasks through the use of such tools.

CO8: Understand the testing techniques to develop an error free software product.

CO9: Briefly investigate problems present in project management and understand the estimation, techniques during a software development cycle.

CO10: Consider the issues and techniques present in confidence gaining measures residing in each phase of the software lifecycle.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓
CO2	✓	✓		✓								✓
CO3	✓											✓
CO4	✓											✓
CO5	✓											✓
CO6	✓	✓		✓								✓
CO7	✓	✓		✓	✓							✓
CO8	✓	✓		✓								✓
CO9	✓	✓	✓	✓								✓
CO10	✓		✓									✓

Course Contents:

Module-1: Software Process Model: A Model of Software Development

Module-2: Requirement Analysis: Requirement Elicitation, specification, IEEE standard template for SRS, Requirement Engineering tools.

Module-3: UML Modeling: Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Component Diagram, Event trace diagram, C++ code generation.

Module-4: Software Metrics: Product, process and project metrics.

Module-5: Software Testing: Structural testing, functional Testing, Testing Strategies, Tactics, Test Case design and Maven ANT

List of Experiments

1. Identifying the Requirements from Problem Statements Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements
2. E-R Modeling from the Problem Statements, Entity Relationship Model, Entity Set and

Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram Importance of ER modeling

3. Identifying Domain Classes from the Problem Statements, Domain Class, Traditional Techniques for Identification of Classes, Grammatical Approach Using Nouns, Advantages, Disadvantages, Using Generalization, Using Subclasses, Steps to Identify Domain Classes from Problem Statement, Advanced Concepts

4. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios, Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include

5. Modeling UML Class Diagrams and Sequence diagrams, Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages.

6. Modeling Data Flow Diagrams, Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD

7. State chart and Activity Modeling State chart Diagrams, Building Blocks of a State chart Diagram State, Transition, Action, Guidelines for drawing State chart Diagrams, Activity Diagrams, Components of an Activity Diagram, Activity, Flow Decision, Merge, Fork, Join, Note, Partition, A Simple Example, Guidelines for drawing an Activity Diagram

8. Estimation of Project Metrics Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics.

9. Estimation of Test Coverage Metrics and Structural Complexity, Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits

10. Ant - Deploying Applications, build.xml, Ant - Executing Java code, Ant - Creating WAR files, basedir, compress, Keepcompression, destfile, duplicate, excludes, excludesfile, includes, includesfile, update.

Text Books

1. Software Engineering: A practitioner's approach: Roger S. Pressman, McGraw- Hill Publications (Sixth Edition).
2. Fundamentals of Software Engineering: Mall, Rajib, Prentice Hall of India, New Delhi (2nd Edition).

References

1. Software Testing Techniques, B. Beizer.
2. Structured Systems Analysis: Tools and Techniques, Gane and Sarson.
3. Software Engineering, Sommerville, Addison Wesley.
4. Modern Structured Analysis, E.Yourdon.
5. An Integrated approach to Software Engineering: Pankaj Jalote, Narosa Publishing House.
6. Structured design, E. Yourdon and L.Constantine.
7. Fundamentals of Software Engineering: Ghezzi, Jazayeri, Mandriol, PHI

TITLE OF COURSE: COMPUTER ORGANIZATION AND ARCHITECTURE

COURSE CODE: CBD301

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Knowledge is required in Basic Computation and any of the high level programming language.

Course Objective:

All students of computing should acquire some understanding and appreciation of a computer system's functional components, their characteristics, their performance, and their interactions. Students need to understand computer architecture in order to structure a program so that it runs more efficiently on a real machine. The course provides an overview of computer architecture and teaches students the operation of a typical computing machine. It covers the basic principles, while acknowledging the complexity of existing commercial systems.

The format of the course will be lecture-discussions, assignments. Students are strongly encouraged to participate actively in class discussions.

Course Outcomes:

The course is intended to create an appreciation for contemporary concepts in high performance multi-core super scalar architectures and appreciate their implementation in modern multi processors. To reach this goal, the following objectives need to be met:

CO1. Draw the functional block diagram of single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.

CO2. Write assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).

CO3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.

CO4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.

CO5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓								
CO2	✓	✓	✓	✓								
CO3	✓	✓	✓	✓								
CO4	✓	✓	✓	✓		✓						✓
CO5	✓	✓	✓	✓								

Course Contents:

MODULE – I:

Functional blocks of a computer: CPU, memory, input-output subsystems, control Module. Instruction set architecture of a CPU—registers, instruction execution cycle, RTL interpretation of instructions, addressing

modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

MODULE – II:

Introduction to x86 architecture.

CPU control Module design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

MODULE – III:

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

MODULE – IV:

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, and write policies.

Text Books

1. “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. “Computer Organization and Embedded Systems”, 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

References

1. “Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw-Hill.
2. “Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education.
3. “Computer System Design and Architecture”, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

TITLE OF COURSE: COMPUTER ORGANIZATION AND ARCHITECTURE LAB

COURSE CODE: CBD391

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Concept of basic components of a digital computer, Basic concept of Fundamentals & Programme structures, Basic number systems, Binary numbers, Representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming, Boolean Algebra, Karnaugh Maps, Logic Gates.

Introduction:

Computer Organization and Architecture is the study of internal working, structuring and implementation of a computer system. ... Organization of computer system is the way of practical implementation which results in realization of architectural specifications of a computer system.

Course Outcomes (CO):

On completion of the course students will be able to

CO1: Use Xilinx ISE or online platform (www.edaplayground.com) independently

CO2: To programme VHDL

CO3: To analyze industry problem and design digital circuits

CO4: Extend the idea of an integrated environment elsewhere

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							
CO2	✓	✓	✓		✓							
CO3	✓	✓	✓		✓							
CO4		✓	✓		✓							✓

Course Contents:

Experiment-1: HDL introduction

Experiment-2: Basic digital logic base programming with HDL

Experiment-3: 8-bit Addition, Multiplication, Division

Experiment-4: 8-bit Register design

Experiment-5: Memory unit design and perform memory operations.

Experiment-6: 8-bit simple ALU design

Experiment-7: 8-bit simple CPU design

Experiment-8: Interfacing of CPU and Memory.

Text Books

1. Computer Organization and Architecture: Designing for Performance, William Stallings, Prentice-Hall India
2. Computer Organization, Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Tata McGraw Hill
3. Computer Architecture A Quantitative Approach, John L Hennessy and David Patterson, Morgan Kaufman
4. Structured Computer Organization, Andrew S. Tanenbaum, Prentice-Hall India

References

1. Computer Architecture & Parallel Processing. Kai Hwang & Briggs, Tata McGraw Hill
2. Computer System Architecture, M. M. Mano, PHI.
3. Computer Organization & Architecture, P N Basu, Vikas Publication

TITLE OF COURSE: DIGITAL SYSTEM DESIGN & COMPUTER ORGANIZATION

COURSE CODE: ECC306

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Knowledge is also assumed of basic concepts of electronics device.

Introduction:

This course examines about Digital Electronics circuit. The Topics are (tentatively) include:

- ☐ Data and Number System
- ☐ Boolean algebra
- ☐ Combinational Circuit
- ☐ Sequential Circuit
- ☐ A/D converter and D/A converter
- ☐ Memory system

Course Outcomes (CO):

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

CO1. Able to explain the basic concepts of digital electronics circuits

CO2. Able to describe different types of logics, complexity, circuit specifications.

CO3. On successful completion of this Course, the students would be able to minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh map).

CO4. Define the problem (Inputs and Outputs), write its functions. Implement functions using digital circuit (Combinational or Sequential) and knowledge in analyzing and designing procedures of Combinational and Sequential circuits.

CO5. To be able to differentiate electronic from electrical systems and identify the basic blocks in any electronic system

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								✓
CO2	✓	✓	✓									✓
CO3	✓			✓								✓
CO4	✓	✓	✓	✓		✓						✓
CO5	✓	✓	✓	✓								

Course Contents:

Module 1:

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

Module 2:

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU. Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation

Module 3:

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

Module 4:

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modelling styles in VHDL, Data types and objects, Dataflow, Behavioural and Structural Modelling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text Books

1. A. Anand Kumar, Fundamentals of Digital Circuits- PHI
2. A.K. Maini- Digital Electronics- Wiley-India
3. Kharate- Digital Electronics- Oxford References

TITLE OF COURSE: DIGITAL SYSTEM DESIGN AND COMPUTER ORGANIZATION LAB

LAB COURSE CODE: ECC396

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Knowledge is also assumed of basic concepts of electronics device.

Objectives:

The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

Course Outcomes (CO):

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

CO1. Able to explain the basic concepts of digital electronics circuits

CO2. Able to describe different types of logics, complexity, circuit specifications.

CO3. On successful completion of this Course, the students would be able to minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh map).

CO4. Define the problem (Inputs and Outputs), write its functions. Implement functions using digital circuit (Combinational or Sequential) and knowledge in analyzing and designing procedures of Combinational and Sequential circuits.

CO5. To be able to differentiate electronic from electrical systems and identify the basic blocks in any electronic system

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓								✓
CO2	✓	✓	✓									✓
CO3	✓			✓								✓
CO4	✓	✓	✓	✓		✓						✓
CO5	✓	✓	✓	✓								

Course Contents:

Exercises that must be done in this course are listed below:

- Experiment No.: 1: To study about logic gates and verify their truth tables.
 Experiment No.: 2: Realization of basic gates using Universal logic gates
 Experiment No.: 3: To design and implement 4-bit Gray to binary code converter
 Experiment No.: 4: Code conversion circuits- BCD to Excess-3 & Excess-3 to BCD
 Experiment No.: 5: One bit and two bit comparator circuit.
 Experiment No.: 6: Construction of simple decoder and multiplexer circuit using NAND gate. Experiment No.: 7: Construction of simple arithmetic circuits – ADDER.
 Experiment No.: 8: Construction of simple arithmetic circuits – SUBTRACTOR.
 Experiment No.: 9: Realization of RS-JK, T and D flip-flop using universal logic gates. Experiment No.: 10: Realization of ring counter and Johnson's counter.

Text Books

1. A.Anand Kumar, Fundamentals of Digital Circuits- PHI
2. A.K.Maini- Digital Electronics- Wiley-India
3. Kharate- Digital Electronics- Oxford

TITLE OF COURSE: ADVANCED PROGRAMMING WITH PYTHON

COURSE CODE: CBD302

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: Students should have knowledge of basic operations of Python

Introduction:

1. Learn basics of computer programming
2. Learn how to solve a given problem
3. Learn to use various paradigms of programming and user interface designing.
4. Learn Python as a programming language.
5. Learn how to implement data structures and functions available in Python to solve problems.

Course Outcomes:

- CO1.** Student learns about Python Integrated Development Environment (IDE).
CO2. Student write Python programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism.
CO3. Create one and two dimensional arrays for sorting, calculating, and displaying of data.
CO4. Write and apply procedures, sub-procedures, and functions to create manageable code.
CO5. Write and apply decision structures for determining different operations.
CO6. Analyze a given problem and implement an algorithm to solve the problem.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓						✓
CO2	✓	✓	✓		✓	✓						✓
CO3	✓	✓	✓		✓	✓						✓

CO4	✓	✓	✓		✓	✓						✓
CO5	✓	✓	✓	✓	✓	✓						✓
CO6	✓	✓	✓		✓	✓						✓

Course Contents:

MODULE – I:

Introduction to Python: Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks.

Python Data Types: Declaring and using Numeric data types: int, float complex, using string data type and string operations, defining list and list slicing, Use of Tuple data type.

MODULE – II:

Python Program Flow: Control Conditional blocks using if, else and elif, Simple for loops in python, for loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block. Python Functions, Modules and Packages: Organizing python codes using functions, organizing python projects into modules, importing own module as well as external modules, Programming using functions, modules and external packages.

MODULE – III:

Python String, List and Dictionary Manipulation, building blocks of python programs Understanding string in build methods List manipulation using in build methods Dictionary manipulation Programming using string, list and dictionary in build functions.

Python File Operation: Reading config files in python, Writing log files in python, Understanding read functions, read (), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations.

MODULE – IV:

Python Object Oriented Programming – OOPS: Concept of class, object and instances Constructor, class attributes and destructors Real time use of class in live projects Inheritance, overlapping and overloading operators Adding and retrieving dynamic attributes of classes Programming using OOPS support.

MODULE – V:

Python Exception Handling: Avoiding code break using exception handling Safeguarding file operation using exception handling handling and helping developer with error code programming using Exception handling.

MODULE – VI:

Python Database Interaction: SQL Database connection using python, creating and searching tables, Reading and storing config information on database, programming using database connections. Python Multithreading: Understanding threads, Synchronizing the threads Programming using multithreading.

Text Books

1. Exploring Python by Timothy Budd.
2. Learn Python the Hard Way by Zed Shaw.

References

1. <https://learncodethehardway.org/python/>

TITLE OF COURSE: ADVANCED PROGRAMMING WITH PYTHON LAB

COURSE CODE: CBD392

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Knowledge is also assumed of basic concepts in data structures, programming languages, and basic mathematics.

Introduction:

- ☐ To write, test, and debug simple Python programs.
- ☐ To implement Python programs with conditionals and loops.
- ☐ Use functions for structuring Python programs.
- ☐ Represent compound data using Python lists, tuples, dictionaries.
- ☐ Read and write data from/to files in Python.

Course Outcomes (CO):

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

CO1: Student learns about Python Integrated Development Environment (IDE).

CO2: Student write Python programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism.

CO3: Create one and two dimensional arrays for sorting, calculating, and displaying of data.

CO4: Write and apply procedures, sub-procedures, and functions to create manageable code.

CO5: Write and apply decision structures for determining different operations.

CO6: Analyze a given problem and implement an algorithm to solve the problem.

CO7: Improve upon a solution to a problem.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓							✓
CO2	✓		✓		✓							✓
CO3	✓		✓									✓
CO4	✓		✓									✓
CO5	✓		✓									✓
CO6	✓	✓										✓
CO7	✓		✓	✓	✓							✓

Course Contents:

1. Exercises that must be done in this course are listed below:

1. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.

Extras:

- ☐ Add on to the previous program by asking the user for another number and printing out that many

copies of the previous message. (Hint: order of operations exists in Python)

☐ Print out that many copies of the previous message on separate lines. (Hint: the string "\n" is the same as pressing the ENTER button)

2. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user.

Extras:

☐ If the number is a multiple of 4, print out a different message.
☐ Ask the user for two numbers: one number to check (call it num) and one number to divide by (check). If check divides evenly into num, tell that to the user. If not, print a different appropriate message.

3. Take a list, say for example this one:

`a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]`

And write a program that prints out all the elements of the list that are less than 5.

Extras:

☐ Instead of printing the elements one by one, make a new list that has all the elements less than 5 from this list in it and print out this new list.
☐ Write this in one line of Python.

4. Create a program that asks the user for a number and then prints out a list of all the divisors of that number

☐ Ask the user for a number and return a list that contains only elements from the original list that are smaller than that number given by the user.

5. Take two lists, say for example these two:

`a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]`

`b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]`

and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.

Extras:

☐ Randomly generate two lists to test this
☐ Write this in one line of Python (don't worry if you can't figure this out at this point - we'll get to it soon)

6. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)

7. Let's say I give you a list saved in a variable: `a = [1, 4, 9, 16, 25, 36, 49, 64, 81, and 100]`.

Write one line of Python that takes this list `a` and makes a new list that has only the even elements of this list in it.

8. Compute the GCD of two numbers.

9. Find the square root of a number (Newton's method)

10. Exponentiation (power of a number)

11. Find the maximum of a list of numbers

12. Linear search and Binary search

13. Selection sort, Insertion sort

14. Merge sort 8. First n prime numbers

15. Multiply matrices
16. Programs that take command line arguments (word count)
17. Find the most frequent words in a text read from a file

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

Text Books

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist“, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers.
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

References

1. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring PythonI, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First ProgramsI, CENGAGE Learning, 2012.
4. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3I, Second edition, Pragmatic Programmers, LLC, 2013.

TITLE OF COURSE: OBJECT ORIENTED PROGRAMMING USING JAVA

COURSE CODE: CBD303

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Knowledge in basic concepts of data structures, algorithms and familiarity with programming languages such as C.

Introduction:

This course presents a conceptual and practical introduction to imperative and object oriented programming, exemplified by Java. As well as providing grounding in the use of Java, the course will cover general principles of programming in imperative and object oriented frameworks. The course should enable you to develop platform independent, secure and robust programs for mobile, internet and distributed systems.

Course Outcomes (CO):

This course will teach the basic concepts and techniques which form the object oriented programming paradigm. To reach this goal, the following objectives need to be met:

CO1: Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.

CO2: Explain the benefits of object oriented design and the types of systems in which it is an appropriate methodology.

CO3: Apply an object-oriented approach to developing applications of varying complexities.

CO4: Augment a class definition using constructors, member functions and custom input/output operators to add functionality to a programming solution.

CO5: Read from and write to files using objects from the standard input output library and custom file operators for future restoration.

CO6: Model specialization using single inheritance and abstract base classes to minimize code duplication.

CO7: Design and compile java programs manipulating strings and text documents.

CO8: Model polymorphic behavior of objects using coercion, overloading and function templates.

CO9: Be able to write simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles.

CO10: Apply understanding of Git version control system to manage files for large and small projects.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>
CO1	✓		✓			✓			✓
CO2	✓	✓		✓				✓	✓
CO3	✓	✓	✓				✓		
CO4	✓	✓			✓	✓			✓
CO5	✓		✓			✓			
CO6	✓	✓		✓			✓		
CO7	✓	✓			✓				
CO8	✓	✓				✓		✓	
CO9	✓	✓	✓	✓					✓
CO10	✓	✓					✓	✓	

Course Contents:

Module-1: Concepts of object oriented programming language: Difference between OOP and other conventional programming – advantages and disadvantages. Object, Class, relationship among classes – association, aggregation, composition, dependency. Abstraction, Inheritance, Encapsulation, Polymorphism.

Module-2: Concepts of java programming : Advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt(), compare To(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), to CharArray() , to LowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & String Buffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(),

setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Module-3: Inheritance, Interface & Packages: Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Module-4: Exception Handling: Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes.

Module-5: Multithreaded Programming: Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Module-6: GUI Programming with Java: Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), Creation of buttons (JButton class only) & text fields.

Module-7: Software version control: Centralized and Distributed version control systems. Concepts of Repository, Copy, Add, Check in, Checkout, Rollback, Tag, Branch, Merge, Conflict, Resolve, Lock. Version control best practices. Version control software-Git

Text Books

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – , Tata Mc Graw Hill.
2. Herbert Schildt, Java:The Complete Reference (Tata McGraw Hill Education Private ,7th Ed).

References

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – Tata McGraw Hill
4. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
5. Ivor Horton's Beginning Java 2 SDK – Wrox

TITLE OF COURSE: OBJECT ORIENTED PROGRAMMING USING JAVA LAB

COURSE CODE: CBD393

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Students must have already registered for the course “Object Oriented Programming Using Java”.

Introduction:

Students will be able to strengthen their problem solving ability by applying the characteristics of an object oriented approach.

Course Outcomes:

Students will be able to apply an object-oriented approach to develop applications of varying complexities.

CO1: Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.

CO2: Explain the benefits of object oriented design and the types of systems in which it is an appropriate methodology.

CO3: Apply an object-oriented approach to developing applications of varying complexities.

CO4: Augment a class definition using constructors, member functions and custom input/output operators to add functionality to a programming solution.

CO5: Read from and write to files using objects from the standard input output library and custom file operators for future restoration.

CO6: Model specialization using single inheritance and abstract base classes to minimize code duplication.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>
CO1	✓				✓	✓			
CO2	✓	✓		✓				✓	✓
CO3	✓		✓			✓	✓		
CO4	✓	✓			✓	✓			✓
CO5	✓		✓	✓				✓	
CO6	✓			✓			✓		✓

Course Contents:

Module-1: Concepts of Java Programming: Class, object creation with source code compilation and execution

Module-2: Data structure using Java: Stack, Queue, and Linked List.

Module-3: String Handling and IO Operations: Methods of String and String Buffer class, Input operations using Scanner and Buffered Reader.

Module-4: Reusability Features Of Java: Inheritance, Packages, Access Specifiers.

Module-5: Exception Handling & Multithreading: User defined exception, usage of exception handling keywords, Thread creation and execution.

Module-6: GUI Programming: Applets, User Interface using Swing.

Module-7: Version Control: Git commands, Project and Branch creation, File addition, Issue tracker.

List of Experiments

1. Class creation with main method and steps of source code compilation and execution.
2. Design a stack and a queue and different types of linked lists for different operations.
3. Implement method overloading and method overriding.
4. Implement different types of inheritance and use of super keyword.
5. Abstract class and interface creation to implement abstraction.
6. Package creation and program using access specifiers.
7. Implement checked and unchecked exceptions through exception handling keywords.
8. Implement multi-thread application using thread class and runnable interface.
9. Calculator application using Java swing.
10. Implement version control using Git commands.

Text Books

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – , Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata McGraw Hill Education Private ,7th Ed).

References

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – Tata McGraw Hill
4. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
5. Ivor Horton's Beginning Java 2 SDK – Wrox

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–III

COURSE CODE: HSMyyy

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INDUSTRIAL PSYCHOLOGY

COURSE CODE: HSM304

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic idea of human behavior.

Introduction:

The industrial psychology course is concerned with the application of psychological theories and principles to organizations. It focuses on increasing efficiency, productivity, and related issues as the physical and mental well-being of employees at industrial organizations.

Course Outcomes (CO):

After having the course, students are expected to:

CO1: Perform a thorough and systematic competency model (job analysis)

CO2: Validate and develop a job specific selection design

CO3: Understand how to design, develop, and evaluate job specific training program

CO4: Explain organizational recruitment, selection and retainment

CO5: Evaluate the work performance of employees

CO6: Explaining the organizational issues including teams, attitudes, and occupational health

CO7: Describe the motivating factors of employees

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓						✓
CO2						✓						✓
CO3						✓				✓		✓
CO4						✓	✓		✓	✓	✓	✓
CO5						✓			✓		✓	✓

CO6						✓	✓		✓	✓	✓	✓
CO7						✓	✓		✓		✓	✓

Course Contents:

Module-1: Introduction to Industrial/Organizational Psychology:

Describing Industrial / Organizational Psychology and what I/O psychologist do. The history of I/O psychology. Research in I/O psychology. Ethics in I/O psychology

Module-2: Job Analysis and Evaluation:

Job analysis and job evaluation

Module-3: Legal Issues and Employee Selection:

The legal process. Determining whether an Employment decision is legal. Harassment. Family medical leave act. Affirmative action. Privacy issues.

Module-4: Employee Selection: recruiting and interviewing

Job analysis, recruitment, realistic job previews, effective employee selection techniques, employment interviews, job search skills.

Module-5: Employee Selection: references and testing

Predicting performance using references and letter of recommendation. Performance using applicant training and education. Performance using applicant knowledge, ability, skill, prior experience, personality and interest and character. Performance limitations due to medical and psychological problems. Comparison techniques

Module-6: Evaluating Selection Techniques and Decisions:

Characteristics of effective selection techniques. Establishing the usefulness of a selection device. Determining the fairness of a test. Making the hiring decision.

Module-7: Evaluating Employee Performance:

Determine the reason for evaluating employee performance, identify environmental and cultural limitations, determine who will evaluate performance, and select the best appraisal method to accomplish your goals, train raters, observe and document performance, evaluate performance, communicate appraisal results to employees, terminate employees Behaviorally anchored rating scales, forced-choice rating scales, mixed standard scales, behavioral observation scales

Text Books:

1. "Industrial/Organizational Psychology, 6th Edition, 2010", Authors: Michael G. Aamodt, Publisher: Cengage Learning, ISBN: 978-0-495-60106-7

TITLE OF COURSE: VALUES AND ETHICS IN PROFESSION

COURSE CODE: HSM305

L-T-P: 3-0-0

CREDITS: 3

Pre-Requisites: Students should have knowledge of society and ethics

Introduction:

This course teaches students the basic principles of Values and Ethics within profession. These deals mainly with

- Values in professional life

- Ethics in professional life
- Resources depletion
- Conservation of resources for future generations
- Technology transfer
- Eco friendly Technology
- Value crisis in society
- Present society without values and Ethics.

This course relates to the present world and teaches students the need and importance of values and the problems faced by the present society in terms of depletion of natural resources and how to control the same for the sake of future generations.

Course Outcomes:

CO1. Understand the present scenario of degradation of values and Ethics system

CO2. Depletion of resources and how to conserve them.

CO3. Club of Rome and what all stalwarts have thought to improve the situation, Sustainable Development.

CO4. Value spectrum of a good life, Present societal changes in terms of values and ethics

CO5. What steps to be taken to improve value system? How to avoid conflicts to have a peaceful job life.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓									
CO2												
CO3	✓	✓	✓									
CO4	✓				✓							
CO5	✓	✓										

Course Contents:

MODULE – I:

Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: Sustainable development Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis. Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

MODULE – II:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond.

MODULE – III:

Values Crisis in contemporary society Nature of values: Value Spectrum Of good life Psychological values: Integrated personality; mental health Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution. Aesthetic values:

Perception and enjoyment of beauty, simplicity, clarity Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Text Books:

1. AN Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996

TITLE OF COURSE: ESP & SDP-III

COURSE CODE: GSC303

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and Basic English languages.

Introduction:

This course examines economy, governance. The Topics are, (tentatively): Economic Affairs, Quantitative Aptitude, Reasoning, Ancient & Medieval History.

Course Outcomes (CO):

In this course we will study the basic components of Indian economy and Reasoning. Students are expected to be capable of understanding their advantages and drawbacks, how to implement them it all over the country, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Understand the values of the exam like Gate, IAS etc.

CO2: Understand the values of tax payment and mutual Fund

CO3: Understand the values of literature, languages etc.

CO4: Understand Working & Policies, Money Market & Capital Market.

CO5: Know about different short cut techniques to solve any kind of aptitudes.

CO6: Know about different short cut techniques to solve any kind of reasoning.

CO7: Know about different short cut techniques to solve any kind of communicating problems.

CO8: Know about different short cut techniques to solve any kind of societal problems.

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Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓
CO5	✓	✓	✓		✓		✓	✓			✓	✓
CO6	✓			✓			✓				✓	✓
CO7	✓	✓	✓	✓			✓	✓			✓	✓
CO8	✓	✓	✓	✓			✓	✓			✓	✓

Course Contents:

Section A: Employment Enhancement Skills-III

Module-1: GK & CA, National income: Concept of GDP, GNP, NNP both in FC & MP, PCI

Tax: Concept of TAX, objective of TAX, Direct & Indirect Tax, Progressive, Regressive & Proportional tax.

Module-2: Market structure: Perfect competition, monopoly, oligopoly, duopoly, monopony, duopoly, Oligopoly. SEBI, IRDA, NHB –Working & Policies, Money Market & Capital Market, functions of Banks & Types of accounts, cheques & loans, Mutual Fund, Banking Terminologies.

Module-3: Science, Technology, Literature (with current updates): Monuments, sculptures, Literature, Languages, Visual arts – paintings etc. Performing arts – classical and folk dances, puppetry etc. ,Religious diversity, Satellite, GPS, SIM, GSM, CDMA, Indian Regional Navigation Satellite System (IRNSS), NAVIC, WIFI, SIM, GPRS, ISRO, NASA.

Module-4: Ancient & Medieval History at a glance: From Indus valley civilization to Pre-Foreign (British, Dutch, French) Invasion. Current Affairs.

Section B: Skill Development for Professional – III

Module-1: Quantitative Aptitude: Basic concept of SI & CI, different formulas & their applications, concept of Growth & Contraction of Business. Data Interpretation- Tables, pie chart, histogram, Bar chart, solution tricks & techniques. Quant Review- Miscellaneous problems from different chapters & short cuts. Indices & Surds- Basic concept, Formulae & their applications, Finding out the square roots, Elimination of Surds, Equation solve. Quadratic Equation- Polynomials, degree, powers, Equation & factors Solution. Progression- Concept of AP, GP & HP

Module-2: Reasoning:

Syllogism: a) Logical Venn diagram b) The If Else Statement

Puzzles a) Seating Arrangement b) Classification c) Seating Arrangement with Blood relations

Machine Input-Output: a) Pattern Based I/O

Inequality: a) Coded Inequality, b) Jumbled Inequality, c) Conditional inequality

Sentence: a) Sentence Corrections b) Fill the blanks with appropriate words/articles/ preposition/ verbs/adverbs/conjunction. **d)** Reading Comprehension (Advance Level) d) Vocabulary

Module-3: Advanced Data Interpretation level-III

Newspaper reading: The Hindu & Economic Times

Text Books

1. Quantitative Aptitude for Competitive Examinations by R S Aggarwal
2. The Indian Economy ...An Analysis of Economic Survey 2019-20 & Budget 2020-21 by Sanjiv Verma
3. Indian Financial System by Sujatra Bhattacharyya

References

1. Indian Economy for Civil Services, Universities and Other Examinations by Ramesh Singh
2. Indian Financial System, by Pathak PEARSON publisher.

TITLE OF COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE: MC301

L-T-P: 0-0-0

CREDITS: 0

Pre-requisite: Basic concepts in social Science.

Introduction:

This course examines basic environment. The Topics are (tentatively) include: Renewable and non-renewable resources, Ecosystems in INDIA, Environmental Pollution, Social Issues and the Environment.

Course Outcomes (CO):

In this course we will study the basic components of numerical system. Students are expected to be capable of understanding the Indian society for environment, their advantages and drawbacks, how to implement them in ecology aspect, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know Environment problem properly.

CO2: Students would be able to know ecology system in India, national plan to protect ecology.

CO3: By analyzing student will be proper person to guide our society

CO4: To become an efficient human being for the society.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓		✓		✓	✓				✓
CO2				✓			✓	✓				✓
CO3		✓	✓				✓	✓				✓
CO4		✓	✓		✓		✓	✓				✓

Course Contents:

Module-1: Basic Ideas of Environment & Ecology, Environmental Geology & Microbiology, Multidisciplinary nature of environmental studies, Definition, scope and importance Need for public awareness,

Module-2: Renewable and non-renewable resources: Natural resources and associated problems.

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Module-3: Ecosystems In INDIA : Basic Concept of an ecosystem, Structure and function of an ecosystem, Energy Flow in Ecosystem, Ecosystem, Biogeochemical Cycles, Nitrogen Cycle, Biodiversity, Biodiversity Hotspots in India, IUCN Red List Conservation of Biodiversity, Importance of Biodiversity, Loss of Biodiversity, Causes of Loss of Biodiversity, Food chains, food webs and ecological pyramids.

Biosphere Reserves in India, Tiger Conservation of India Wildlife, Protection Act 1972, Climate Change in India Alien Invasive Species, Paris Agreement, UNFCCC, Kyoto Protocol, Albedo of Earth, National Green Tribunal Montreal Protocol, Kigali Agreement, Green House Gases (GHGs), Air Pollutants Central Board, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

National Health Mission, National Action Plan on Climate Change, National Water Mission, National Mission for Sustaining Himalayan Ecosystem (NMSHE), National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, Green India Mission

Module-5: Environmental Pollution: Environmental ethics, Cause, effects and control of:- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, global warming, acid rain, Climate change, ozone layer depletion, nuclear accidents and holocaust.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Module-7: Social Issues and the Environment: Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns.

Module-7: Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Program, Environment and human health, Human Rights, Value Education, Women and Child Welfare, Role of Information Technology in Environment and human health, Virus and vaccination.

Text Books

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., India,
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
4. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
6. Environmental Encyclopedia, Jaico Publ. House, Mumbai,
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev, Environment & Security. Stockholm Env. Institute Oxford Univ. Press.

Fourth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	BSC	BSC---	Mathematics-IV	3	1	0	4
2.	CC	CBC407	Operating System	3	0	2	4
3.	CC	CBC408	Database Management System	3	0	2	4
4.	CC	CBC409	Software Design with UML	3	0	2	4
5.	CC	CBC410	Introduction to Innovation, IP Management & Entrepreneurship	3	0	0	3
6.	HSM	HSM---	Business Communication & Value Science-IV	3	0	0	3
7.	GSC	GSC404	ESP & SDP - IV	2	0	0	2
8.	NPT	NPT403	(NPTEL)	-	-	-	2
9.	PTI	INT403	Internship Industrial Training/Project-II	0	0	2	1
10.	MAR	MAR484	Mandatory Additional Requirements (MAR)	0	0	1	0.5
Total				20	1	9	27.5/30

(NPT403): NPTEL courses are based on the respective year's offered course

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	BSC	BSC406	Numerical Methods & Operation Research	3	0	0	3
2.	BSC	BSC407	Operation Research	3	0	0	3
3.	BSC	BSC408	Statistics for Data Analysis	3	0	0	3
4.	BSC	BSC409	Graph Theory	3	0	0	3
5.	HSM	HSM406	Economics for Engineers	3	0	0	3
6.	HSM	HSM407	Principle of Management	3	0	0	3
7.	HSM	HSM408	Total Quality Management	3	0	0	3



TITLE OF COURSE: NUMERICAL METHODS AND OPERATION RESEARCH

COURSE CODE: BSC406

L-T-P: 3-0-0

CREDITS: 3

Pre-Requisites: Students should have knowledge of mathematics

Introduction:

The aim is to teach the student various topics in Numerical Analysis such as solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations. Operational Research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimization problems. Use mathematical software to solve the proposed models. Develop a report that describes the model and the solving technique, analyses the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Course Outcomes:

The students will learn:

CO1. Students are able to understand the nature and operations of Numerical Analysis.

CO2. Student is expected to solve real-life and Engineering applications.

CO3. Formulate and solve mathematical model (linear programming problem) for a physical situation like production, distribution of goods and economics.

CO4. Solve the problem of transporting the products from origins to destinations with least transportation cost.

CO5. Identify the resources required for a project and generate a plan and work schedule.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓		✓								
CO2					✓	✓	✓					
CO3				✓	✓	✓	✓					
CO4							✓	✓	✓			
CO5		✓	✓						✓	✓		

Course Contains:

MODULE – I:

Accuracy and Precision: Error Analysis. Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

MODULE – II:

Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method, Least square approximation.

MODULE – III: Linear Programming Problems

Basic LPP and Applications, LP Problem Formulation, Simultaneous Equations and Graphical Method, Simplex Method, Big-M Method, Duality Theory, Transportation Problems and Assignment Problem.

MODULE – IV: Game Theory

Introduction; 2-Person Zero – sum Game; Saddle Point; Mini – Max and Maxi – Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance.

MODULE – V: Queuing Theory

Introduction, Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1:∞/FIFO) and (M/M/1:N/FIFO).

Text Books

1. Dutta & Jana: Introductory Numerical Analysis (All course).
2. Dr. B. S. Grewal: Numerical Methods in Engineering & science
3. Jain, Iyengar, & Jain: Numerical Methods (Problems and Solution).

Reference

1. Baburam: Numerical Methods, Pearson Education.
2. H.A.Taha, “Operations Research”, Pearson
3. P. M.Karak–“Linear Programming and Theory of Games”, ABS Publishing House
4. Ghosh and Chakraborty, “Linear Programming and Theory of Games”, Central Book Agency
5. Ravindran, Philips and Solberg- “Operations Research”, WILEYINDIA
6. Kanti Swaroop— “Operations Research”, Sultan Chand & Sons

TITLE OF COURSE: OPERATION RESEARCH

COURSE CODE: BSC407

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic mathematics and statistics.

Introduction:

The aim is to teach the student various topics in Numerical Analysis such as solutions of nonlinear equations in one variable, interpolation and approximation, numerical differentiation and integration, direct methods for solving linear systems, numerical solution of ordinary differential equations. Operational Research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimization problems. Use mathematical software to solve the proposed models. Develop a report that describes the model and the solving technique, analyses the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Course Outcomes (CO):

The students will learn:

CO1: Students are able to understand the nature and operations of Numerical Analysis.

CO2: Student is expected to solve real-life and Engineering applications.

CO3: Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.

CO4: Solve the problem of transporting the products from origins to destinations with least transportation cost.

CO5: Identify the resources required for a project and generate a plan and work schedule.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓		✓		✓							✓
CO3	✓		✓		✓							✓
CO4	✓		✓		✓							✓
CO5	✓		✓		✓							✓

Course Contents:

Numerical Methods

MODULE 1:

Accuracy and Precision: Error Analysis. Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

MODULE 2:

Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method, Least square approximation.

Operation Research

Module 3: Linear Programming Problems

Basic LPP and Applications, LP Problem Formulation, Simultaneous Equations and Graphical Method, Simplex Method, Big-M Method, Duality Theory, Transportation Problems and Assignment Problem.

Module 4: Game Theory

Introduction; 2-Person Zero – sum Game; Saddle Point; Mini – Max and Maxi – Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance.

Module 5: Queuing Theory

Introduction, Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1:∞/FIFO) and (M/M/1:N/FIFO).

Reference Books

1. Dutta & Jana: Introductory Numerical Analysis (All course).
2. Dr. B. S. Grewal: Numerical Methods in Engineering & science
3. Jain, Iyengar, & Jain: Numerical Methods (Problems and Solution).
4. Baburam: Numerical Methods, Pearson Education.
5. H.A.Taha, "Operations Research", Pearson
6. P. M.Karak—"Linear Programming and Theory of Games", ABS Publishing House
7. Ghosh and Chakraborty, "Linear Programming and Theory of Games", Central Book Agency
8. Ravindran, Philips and Solberg- "Operations Research", WILEYINDIA
9. Kanti Swaroop— "Operations Research", Sultan Chand & Sons

TITLE OF COURSE: GRAPH THEORY

COURSE CODE: BSC409

L-T-P: 3-0-0

CREDITS: 3

Pre-Requisites: Knowledge is also assumed of basic concepts in mathematics and data structure & algorithm.

Introduction

In the domain of mathematics and computer science, graph theory is the study of graphs that concerns with the relationship among edges and vertices. It is a popular subject having its applications in computer science, information technology, biosciences, mathematics, and linguistics to name a few. Without further ado, let us start with defining a graph.

Course Outcomes:

The students should be able to:

CO1. Write precise and accurate mathematical definitions of objects in graph theory.

CO2. Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.

CO3. Validate and critically assess a mathematical proof.

CO4. Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

CO5. Reason from definitions to construct mathematical proofs.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓		✓		✓							✓
CO3	✓		✓		✓							✓
CO4	✓		✓		✓							✓
CO5	✓		✓		✓							✓

Course Contains

Module 1: Introduction

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

Module 2: Trees, Connectivity & Planarity

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

Module 3: Matrices, Coloring and Directed Graph

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations –

Directed paths and connectedness – Euler graphs.

Module 4: Permutations & Combinations

Fundamental principles of counting – Permutations and combinations – Binomial theorem – combinations with repetition – Combinatorial numbers – Principle of inclusion and exclusion
Derangement – Arrangements with forbidden positions.

Module: 5 Generating Functions

Generating functions – Partitions of integers – Exponential generating function – Summation operator – Recurrence relations – First order and second order – Non-homogeneous recurrence relations – Method of generating functions.

Reference Books

1. Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India, 2003.
2. Grimaldi R.P. “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 1994.
3. Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers, 1995.
4. Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians”, Prentice Hall of India, 1996.
5. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 1985.
6. Rosen K.H., “Discrete Mathematics and Its Applications”, Mc Graw Hill, 2007. Anna University

TITLE OF COURSE: OPERATING SYSTEM

COURSE CODE: CBC407

L-T-P: 3-0-2

CREDITS: 4

Pre-Requisites: Knowledge is also assumed of basic concepts in mathematics and basic computing.

Introduction:

In this course we will study the basic components of an operating system, their functions, mechanisms, policies and techniques used in their implementation and examples from popular operating systems. The way different modules in the operating system interact and work together to provide the basic services of an operating system.

The Topics are (tentatively) include:

- Computer and operating system structures
- Process and thread management
- Process synchronization and communication
- Memory management
- Virtual memory
- File system
- I/O subsystem and device management
- Selected examples in networking, protection and security

Course Outcomes:

CO1. Understand the theory and logic behind the design and construction of operating systems.

CO2. You will examine the algorithms used for various operations on operating systems.

CO3. Become aware of the issues in the management of resources like processor, memory and I/O.

CO4. Know the problems in the design of operating system and study the probable solutions. Learn to calculate the performance of CPU scheduling and disk scheduling

CO5. Learn File systems and methods of accessing, Understanding various security threats

CO6. An overview of advanced operating systems and compare the technical aspects of all the advanced operating systems

Application:

1. To develop, implement, and debug various CPU scheduling algorithms
2. To develop, implement, and demonstrate the algorithms of synchronizing the processes
3. To develop algorithms to find deadlocks
4. To develop Disk scheduling algorithms

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓	✓	✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Contents:

MODULE – I:

Introduction, Operating system structure - Monolithic systems, Layered systems, Virtual machines, Client-Server model.

MODULE – II:

Process Management – process creation, deletion, inter process communication tools: pipe, FIFO, shared memory, process synchronization, synchronization primitives and Classical IPC problems.

MODULE – III:

Process scheduling, Processor Allocation - Allocation Model, Design issues for processor allocation algorithms, Threads and Deadlock.

MODULE – IV:

Memory Management, paging scheme, segmentation, virtual memory concept, page replacement algorithms, thrashing, working set model, issues in Virtual memory management.

MODULE – V:

File System management. Input output management, Disk scheduling, Case study of UNIX/LINUX.

Text Books

1. Silberschatz, P. Galvin and Greg Gagne, “Operating System Concepts”, Wiley International Company.
2. A.S. Tanenbaum, Modern Operating Systems, Prentice Hall India.

References

1. J. Archer Harris, Operating systems – Schuam’s outlines, Tata Mc Graw Hill.
2. Gary Nutt, Operating Systems – A modern perspective, Pearson Education.

TITLE OF COURSE: OPERATING SYSTEM LAB

COURSE CODE: CBC497

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Knowledge is also assumed of basic concepts in mathematics and basic computing.

Introduction:

1. To learn and understand system calls related to files, processes, signals, semaphores and implement system programs based on that.
2. To provide an understanding of the design aspects of operating system.
3. To provide an efficient understanding of the language translation peculiarities by designing a complete translator for a mini language

Course Outcomes (CO):

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

CO1: Understand the theory and logic behind the design and construction of operating systems.

CO2: You will examine the algorithms used for various operations on operating systems.

CO3: You will differentiate between various operating systems functionalities in terms of performance.

CO4: Become aware of the issues in the management of resources like processor, memory and input-output.

CO5: Know the problems in the design of operating system and study the probable solutions.

CO6: Learn to calculate the performance of CPU scheduling and disk scheduling

CO7: Learn File systems and methods of accessing

CO8: Understanding various security threats

CO9: An overview of advanced operating systems and compare the technical aspects of all the advanced operating systems

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓								✓
CO2	✓	✓		✓								✓
CO3	✓		✓	✓								✓
CO4	✓	✓	✓		✓							✓
CO5	✓		✓	✓								✓
CO6	✓	✓	✓	✓								✓
CO7	✓		✓									✓
CO8	✓	✓	✓	✓	✓	✓						✓
CO9	✓		✓		✓							✓

**Course Contents:**

Exercises that must be done in this course are listed below:

- Exercise No.1: CPU scheduling
- Exercise No. 2: File allocation Strategy
- Exercise No. 3: Simulate MVT, MFT (Multiprogramming Fixed and Variable)
- Exercise No. 4: Simulate all File Organization Techniques
- Exercise No. 5: Simulate Banker's Algorithm for Dead Lock Avoidance
- Exercise No. 6: Simulate Banker's Algorithm for Dead Lock Prevention
- Exercise No. 7: Simulate all page replacement Strategies
- Exercise No. 8: Simulate Paging Technique of Memory Management
- Exercise No. 9: Shell programming (cut, grep, sed) Exercise No. 10: Process

Text Book:

1. Maurice J. Bach, Design of the UNIX Operating System, PHI.

Recommended Systems/Software Requirements:

Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
Turbo C or TC3 compiler in Windows XP or Linux Operating System.

TITLE OF COURSE: DATABASE MANAGEMENT SYSTEM**COURSE CODE: CBC408****L-T-P: 3-0-2****CREDITS: 4****Pre-Requisites:** Basic concept of Data Structure & Programming languages

Introduction: A Database Management System (DBMS) is a software system designed to efficiently store, retrieve, manipulate, and query large amounts of data. Since the introduction of the relational data model in 1970, the database management system industry has grown to \$100 billion dollars a year and increases by more than 25% every year. With the new and emerging internet applications posing new requirements in the DBMS design and implementation, the database market is expected to grow even faster, and database design and implementation techniques are constantly evolving to meet the new requirements.

Course Outcomes:

This course will serve to broaden the student's understanding of the issues and latest developments in the area of Database Management System and its maintenance. To reach this goal, the following objectives need to be met:

- CO1.** Ability to build normalized databases.
- CO2.** Knowledge of Entity Relationship Modeling. Familiarity with SQL, embedded SQL and PLSQL.
- CO3.** Familiarity with query processing and query optimization techniques. Understanding of transaction processing.
- CO4.** Ability to handle recovery and concurrency issues.
- CO5.** Familiarity with ODBC, JDBC

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓		✓		✓						
CO3	✓	✓				✓						
CO4	✓	✓					✓					
CO5	✓	✓		✓		✓	✓					

Course Contents:

MODULE – I:

Introduction to DBMS- Concept & overview of DBMS, Data Models & database Language, Database Administrator, Database Users, architecture of DBMS, Three levels of abstraction.

MODULE – II:

Entity Relationship Model – Basic concepts, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features. Relational Model-Structure of relational Databases, Relational Algebra, Relational Algebra Operations, Views, Modifications of the Database.

MODULE – III:

SQL and Integrity Constraints: Concept of DDL, DML, DCL, Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, nested Sub queries.

MODULE – IV:

Relational Database Design: -Functional Dependency, Different anomalies in designing a Database, Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF.

MODULE – V:

Transaction: -Transaction concept, transaction model, serializability, transaction isolation level, Transaction atomicity and durability, transaction isolation and atomicity. Concurrency control and recovery system: Lock based protocol, dead lock handling, time stamp based and validation based protocol, failure. Classification, storage, recovery algorithm, recovery and atomicity, backup.

MODULE – VI:

Internals of RDBMS:-Physical data structures, Query optimization: join algorithm, Statistics and cost based optimization.

MODULE – VII:

File Organization & Index Structures: -File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

Text Books

1. Silberschatz, Korth and Sudarshan, “Database System Concepts”, 6th Edition, McGraw Hill, 2010
2. Elmasri and Navathe, “Fundamentals of Database Systems”, 6th Edition, Pearson, Addison-Wesley, 2010

References

1. C.J. Date, “An Introduction to Database Systems”, 8th Edition, Addison-Wesley, 2003

2. Ramakrishnan&Gherke, Database Management Systems, 2nd Edn., McGraw
3. Connolly and Begg, “Database Systems”, 4th Edn., Addison-Wesley, 2005
4. Toby, Lightstone and Jagadish, “Database Modeling and Design”, 5thEdn, Elsevier, 2011
5. Coronel and Rob, “Database Systems”, 9th Edn., Cen gage, 2011

TITLE OF COURSE: DATABASE MANAGEMENT SYSTEM LAB

COURSE CODE: CBC498

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Knowledge is also assumed of basic concepts of DBMS.

Introduction:

At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a standalone and shared database including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL. In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user. All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques. One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Course Outcomes (CO):

This course will serve to broaden the student's understanding of the issues and latest developments in the area of Database Management System and its maintenance. To reach this goal, the following objectives need to be met:

CO1: Ability to build normalized databases.

CO2: Knowledge of Entity Relationship Modeling.

CO3: Familiarity with SQL, embedded SQL and PLSQL, query processing and query optimization techniques, ODBC, JDBC

CO4: Understanding of transaction processing.

CO5: Ability to handle recovery and concurrency issues.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓

CO2	✓	✓	✓									✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓		✓	✓						✓
CO5	✓	✓	✓	✓								✓

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1:

ER Model: An entity-relationship model (ERM) is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system.

Exercise No. 2:

EER Model: In computer science, the enhanced entity-relationship (EER) model is a high-level or conceptual data model incorporating extensions to the original entity-relationship (ER) model, used in the design of databases. It was developed by a need to reflect more precisely properties and constraints that are found in more complex databases.

Exercise No. 3:

Relational Model: The relational model for database management is a database model based on first-order predicate logic, first formulated and proposed in 1969 by E.F. Codd. The model uses the concept of a mathematical relation, which looks somewhat like a table of values -as its basic building block, and has its theoretical basis in set theory and first-order predicate logic.

Exercise No. 4:

1 NF: First normal form (1NF or Minimal Form) is a normal form used in database normalization. A relational database table that adheres to 1NF is one that meets a certain minimum set of criteria. These criteria are basically concerned with ensuring that the table is a faithful representation of a relation and that it is free of repeating groups.

Exercise No. 5:

2 NF: Second normal form (2NF) is a normal form used in database normalization. 2NF was originally defined by E.F. Codd in 1971. A table that is in first normal form(1NF) must

Exercise No. 6:

3 NF: The Third normal form (3NF) is an important form of database normalization. 3NF is said to hold if and only if both of the following conditions hold: • The relation R (table) is in second normal form (2NF) • Every non-prime attribute of R is non-transitively dependent (i.e. directly dependent) on every candidate key of R.

Exercise No. 7:

BCNF: A relation R is in Boyce-Codd normal form (BCNF) if and only if every determinant is a candidate key. The definition of BCNF addresses certain (rather unlikely) situations which 3NF does not handle.

Exercise No. 8:

SQL-1: In this Lab., we discuss basic SQL operations like creating a table, deleting a table, changing the schema of the table, primary key and foreign key constraints on a table and creating indexes on tables.

Exercise No. 9:

SQL-2: Its scope includes efficient data insert, query, update and delete, schema creation and modification, and data access control. In this lab., we discuss SQL operations for populating the tables

like inserting into a table, deleting values from a table, and updating the content of the tables.

Text Books

1. Silberschatz, Korth and Sudarshan, “Database System Concepts”, 6th Edition, McGraw Hill, 2010
2. Elmasri and Navathe, “Fundamentals of Database Systems”, 6th Edition, Pearson, Addison Wesley, 2010
3. Ivan Bayross, “The programming language of oracle”, 5th Edition, BPB Publication 2016

References

1. “Database Systems: A Practical Approach to design, Implementation and Management”. Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
3. Bipin C Desai, An Introduction to Database Systems, Galgotia. Publications Pvt Limited, 2001
4. “An Introduction to Database Systems”, C.J.Date, Pearson Education.
5. “A first course in Database Systems”, Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
6. “Data Management: databases and organization”, Richard T. Watson, Wiley.
7. “Data Modeling Essentials”, Graeme C. Simxion, Dreamtech.
8. Introduction to Data Base Management, Naveen Prakash, Tata McGraw Hill
9. “Oracle 10g manuals”.

TITLE OF COURSE: SOFTWARE DESIGN WITH UML

COURSE CODE: CBC409

L-T-P: 1-0-0

CREDITS: 4

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INTRODUCTION TO INNOVATION, IP MANAGEMENT & ENTREPRENEURSHIP

COURSE CODE: CBC410

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–IV

COURSE CODE: HSM406

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: ECONOMICS FOR ENGINEERING

COURSE CODE: HSM406

L-T-P: 3-0-0

CREDITS: 3

Introduction:

It consists of Economic Decisions Making, cash flow, different decision making skills of economics etc.

Course Outcomes (CO):

CO1: To make fundamentally strong base for decision making skills by applying the concepts of economics.

CO2: Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.

CO3: Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓						✓			✓	✓
CO2	✓	✓		✓							✓	✓
CO3	✓	✓	✓	✓							✓	✓

Course Contents:

Module 1

Economic Decisions Making – Overview, Problems, Role, Decision making process. Engineering Costs & Estimation– Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Non-recurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models-Per-Module Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.

Module 2

Cash Flow, Interest and Equivalence: Cash Flow Diagrams, Categories & Computation, Time Value of Money, Debt payment, Nominal & Effective Interest. Cash Flow & Rate Of Return Analysis– Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Break even Analysis. Economic Analysis In The Public Sector – Quantifying And Valuing Benefits & drawbacks.

Module 3

Inflation And Price Change Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.

Present Worth Analysis: End-Of Year Convention, View point Of Economic Analysis Studies, Borrowed Money View point, Effect of Inflation & Deflation, Taxes, Economic Criteria, Applying Present worth Techniques, Multiple Alternatives.

Uncertainty In Future Events-Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, and Expected Value, Economic Decision Trees, Risk, and Risk vs Return, Simulation, Real Options.

Module 4

Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods,

Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.

Replacement Analysis- Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems.

Accounting–Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Text Books:

1. James L. Riggs, David D. Bedworth, Sabah U. Randhawa: Economics for Engineers 4e, Tata Mc Graw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle: Engineering Economics Analysis, OUP
3. John A. White, Kenneth E. Case, David B. Pratt: Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R. Paneer Seelvan: Engineering Economics, PHI
6. Michael R. Lindeburg : Engineering Economics Analysis, Professional Pub Readings

References:

1. James L. Riggs, David D. Bedworth, Sabah U. Randhawa: Economics for Engineers 4e, Tata Mc Graw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle: Engineering Economics Analysis, OUP
3. John A. White, Kenneth E. Case, David B. Pratt: Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R. Paneer Seelvan: Engineering Economics, PHI
6. Michael R. Lindeburg : Engineering Economics Analysis, Professional Pub

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–IV

COURSE CODE: HSMyyy

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: PRINCIPLE OF MANAGEMENT

COURSE CODE: HSM407

L-T-P: 3-0-0

CREDITS: 3

Pre-Requisites: Students should have knowledge of work management

Introduction:

This course deals with the principles of Management within workplace. Students understand the intricacies of management that operates to extract work from the employees. Students dig into topics like:

- Basic concepts of Management

- Functions of Management
- Structure of Management
- How management and society are interlinked
- People Management
- Leadership concepts
- Quantitative methods
- Customer relations

Course Outcomes:

Learning the various modes of operations for the management.

CO1. Customer handling and taking care of their needs and requirements keeping in mind the basic infrastructure of the company.

CO2. Managing people and their mode of work.

CO3. Understanding leadership skills that leads to growth of an individual.

CO4. Understanding the link between society and management and how to maintain a balance between the two.

CO5. Company's responsibility towards the society through CSR and Quantitative Methods.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1						✓					✓	
CO2						✓		✓	✓		✓	✓
CO3									✓		✓	✓
CO4						✓		✓	✓			✓
CO5											✓	✓
CO6						✓			✓		✓	

Course Contents:

MODULE – I:

Basic concepts of Management: Definition, essence, Functions, Roles, Level Functions of Management Planning: Concept, Nature, Types, Analysis, Management, objectives

Structure: Concept, Structure, Principles, Centralization, Decentralization, Spn of Management, Organizational Effectiveness

MODULE – II:

Management and Society: Concept, external environment, CSR, Corporate Governance, and Ethical Standards. People Management: Overview, Job design, Recruitment and Selection, Stress Management Managerial competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, and Entrepreneurship.

MODULE – III:

Leadership concept: Nature, Styles, Decision Making, Process, Tools and Techniques. Economic, Financial and quantitative Analysis : Production Markets, National Income Accounting, Financial Function, and goals, Financial statements, Ratio Analysis. Quantitative Methods: Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control

MODULE – IV:

Customer Management: Market planning and research, Market Mix, Advertising and Brand Management. Operations and Technology Management: Production and Operations Management, Logistics, & supply chain Management. TQM, Kaizen and Six Sigma, MIS.

TEXT BOOK:

1. “Management” by Stoner J A and Freeman R E
2. “Great Ideas in Management” by Parkinson C N and Rustomji M K and Sapre S A
3. “Management Principles and Practices” by Lallan Prasad and S S Gulshan

REFERENCES:

1. “Management: Principles and Practice” by S K Mandal
2. “Principles and Practices of Management” by Khusboo Manoj

TITLE OF COURSE: TOTAL QUALITY MANAGEMENT

COURSE CODE: HSM408

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic idea of leadership, need of quality department, training, product/service design etc.

Introduction:

Total quality management concepts include the Quality & Management Philosophies, Managing Quality and control, Managing Quality and control and TQM tools.

Course Outcomes (CO):

This course will serve to broaden the student's understanding of the issues and latest developments in the area of total quality management. To reach this goal, the following objectives need to be met:

CO1: Define the current state of total quality management.

CO2: Understand the Quality & Management Philosophies.

CO3: Become familiar with Managing Quality and control.

CO4: Familiar with TQM Tools.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												✓
CO2												✓
CO3						✓						✓
CO4					✓	✓						✓

Course Contents:

Module-I Introduction

Definition of Quality, Small q & Big Q, Quality characteristics- weaves, Dimensions, determinants, Quality Planning, Quality & profitability - idea, Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

Module-II Quality & Management Philosophies

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement: Deming Philosophy- Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Demings wheel. Juran Philosophy- 10 steps for quality improvement, quality trilogy, and universal breakthrough sequence. Crosby Philosophy- Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

Module-III Managing Quality and control

Traditional vs. Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve. Objectives of quality control, seven tools of quality, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, Concept of six sigma, New seven Management tools

Module-IV TQM Tools

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD)– House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA

Module-V Quality Systems

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

Text Book:

1. Total Quality Management, Poonia & Sharma, Khanna Publishing House
2. Total Quality Management, Gopal, PHI
3. Dale H.Besterfield, et al., "Total Quality Management", Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

References:

1. James R.Evans & William M.Lidsay, "The Management and Control of Quality", (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5)
2. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.

TITLE OF COURSE: ESP & SDP-IV

COURSE CODE: GSC404

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and economics.

Introduction:

This course examines Taxes in India and market structure. The Topics are (tentatively) include: National income, Market structure, Science & Technology, Logical Reasoning.

Course Outcomes (CO):

In this course we will study the basic components of upcoming Science & technology. Students are expected to be capable of understanding the Indian Tax system, their advantages and drawbacks, how to implement in Indian Economy, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Know about many books and authors.

CO2: Gain knowledge about important dances & festivals of Indian states.

CO3: Understand the values of Important about banks like payment banks, small banks & license system.

CO4: Know about many learning techniques.

CO5: Know about different short cut techniques to solve any kind of aptitudes.

CO6: Know about different short cut techniques to solve any kind of reasoning.

CO7: Know about different short cut techniques to solve any kind of communicating problems.

CO8: Know about different short cut techniques to solve any kind of societal problems.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓
CO5	✓	✓	✓		✓							✓
CO6	✓			✓								✓
CO7	✓	✓	✓									✓
CO8	✓	✓	✓		✓							✓

Course Contents:

Section A: Employment Enhancement Skills-IV

Course Contents:

Module-1: GK & CA, Modern History & National Movement. Indian Geography at a glance (Physical, Regional & Economic)

Tax: Concept of TAX, objective of TAX, Direct & Indirect Tax, Progressive, Regressive & Proportional tax.

Module-2: Calendar etc. capitals of countries, currency of countries, important dates, Sports football, hockey etc. recent events & awards too.

Module-3: Important books & authors, Important Hydropower dams, atomic power plant s, important national parks, Minister & portfolio & constituencies, Population census, Persons in news

- most famous, popular recent only,

Module-5: Important dances & festivals of Indian states, International Head Quarters & world organization, important president & pm elected from various countries

Module-6: Important about banks like payment banks, small banks & license system, Awards, Sports, Books & author, National & International affairs.

Section B: Skill Development for Professional – IV

Module-1: Quantitative Aptitude: Permutation & Combination. Probability- basic concepts of probability, different theorems & applications, binomial, poisson & normal Distributions. Geometry- Concept of different shapes like triangle, quadrilateral, rectangle, square, circle etc. different theorems & their applications. Mensuration- Formulae on triangles, square, Rhombus, parallelogram, sphere, circle, cone, pyramid etc. Application based problem solving. Coordinate Geometry- Locus, Straight lines, Circle etc

Module-2: Reasoning:

Puzzles: Seating Arrangement

- a) Circular seating arrangement
- b) Square seating Arrangement
- c) Line Arrangement, Calendar and Clock, Miscellaneous Problems

Sentence: a) Sentence Corrections b) Fill the blanks with appropriate words/articles/ preposition/ verbs/adverbs/conjunction. **d)** Reading Comprehension (Advance Level) d) Vocabulary

Logical Reasoning: Alphanumeric series, Analogies, Artificial Language, Blood Relations, Calendars, Cause and Effect, Clocks, Coding-Decoding, Critical path, Cubes and cuboids. Data Sufficiency, Decision Making, Deductive Reasoning/Statement Analysis, Dices, Directions Embedded Images, Figure Matrix, Input-Output, Mirror and Water Images, Odd One Out, Picture Series and Sequences, Paper Folding, Puzzles, Pattern Series and Sequences, Order & Ranking, Seating Arrangements, Shape Construction, Statement and Assumptions, Statement and Conclusions, Syllogism

Module-3: Advanced Data Interpretation level-IV

Newspaper reading: The Hindu & Economic Times

Text Books

1. The Oxford Handbook of Tax System in India: An Analysis of Tax Policy and Governance (Oxford Handbooks) by Mahesh C. Purohit, Vishnu Kanta Purohit
2. Taxation of Income From Non Resident Indian under Direct Tax Law - 2019 Edition by Ram Dutt Sharma

References

1. Marketing Management | marketing cases in the Indian context | Fifteenth Edition | By Pearson by Philip Kotler, Keven Lane Keller
2. A Modern Approach to Logical Reasoning, by R.S. Aggarwal

Fifth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	CC	CBC511	Data Mining and Analytics	3	0	2	4
2.	CC	CBC512	Introduction to Statistical Softwares (MATLAB, SPSS)	3	0	2	4
3.	CC	CBC513	Behavioral Sciences	3	0	0	3
4.	CC	CBC514	Design & Analysis of Algorithm	3	0	2	4
5.	CC	CBC515	Data Communication & Networking	3	0	2	4
6.	DE	---	Discipline Elective-I	2	0	2	3
7.	GSC	GSC505	ESP & SDP - V	2	0	0	2
8.	NPT	NPT504	(NPTEL)	-	-	-	2
9.	PTI	INT504	Internship Industrial Training/Project-III	0	0	2	1
10.	MAR	MAR585	Mandatory Additional Requirements (MAR)	0	0	1	0.5
Total				19	0	13	27.5/32

##(NPT504) NPTEL courses are based on the respective year's offered course

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CBD504	Infrastructure Design	2	0	2	3
2.	DE	CBD505	Cloud Computing	2	0	2	3
3.	DE	ECC408	Microprocessor & Microcontrollers	2	0	2	3

TITLE OF COURSE: DATA MINING AND ANALYTICS

COURSE CODE: CBC511

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Basic concepts in mathematics and programming languages.

Introduction:

- Describe and use the dimensional modeling techniques.
- Use OLAP analysis with contemporary analysis and visualization tools.
- Understand the purpose of data mining and knowledge discovery process.
- Understand several different data mining techniques such as market basket analysis, Clustering, classification.

Course Outcomes:

CO1. Understand the concepts of Data Mining

CO2. Familiarize with association rule mining

CO3. Familiarize various classification algorithms

CO4. Understand the concepts of Cluster analysis

CO5. Implement the Data mining concepts with various domains

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1												
CO2				✓								
CO3			✓							✓		
CO4				✓								✓
CO5			✓									✓

Course Contents:

MODULE – I: Introduction

Introduction to Data Mining – Kinds of Data- Data mining Functionalities – Interesting Patterns - Task Primitives - Issues in Data Mining -Data Preprocessing.

MODULE – II: Association Rules

Basic Concepts - Frequent Item Set Mining Methods - Association Rules - Correlation analysis.

MODULE –III: Classification and Prediction

Issues Regarding Classification and Prediction-Decision Tree Induction Classification-Bayesian and Rule Based Classification-Support Vector Machine-Prediction.

MODULE – IV: Cluster Analysis

What is cluster analysis- Types of Data in Cluster Analysis-Categorization of Clustering Methods- Hierarchical Methods?

MODULE – V: Plastic Analysis, Text and Web Mining

Applications and Trends in Data Mining-Machine Learning-Big Data -Cloud Computing. Text mining: extracting attributes (keywords), Bayesian approach to classifying text. Web mining: classifying web pages, Extracting knowledge from the web.

Text Book

1. Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", Second Edition, Morgan Kaufmann Publishers, 2006.

Reference

1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education. 2001.
2. D. Hand, H. Mannila and P. Smyth, "Principles of Data Mining", Prentice Hall. 2001.
3. I H. Witten and E. Frank, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann. 2000.
4. Nathan Marz, James Warren, "Big Data-Principles and best practices of scalable real-time data systems", DreamTech Press, 2015
5. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", University Press, 2016

TITLE OF COURSE: INTRODUCTION TO STATISTICAL SOFTWARES (MATLAB, SPSS)

COURSE CODE: CBC512

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Students should have knowledge of good knowledge of basic descriptive and inferential statistics. It is advisable to have a have a good familiarity with PC operations, working knowledge of spreadsheet application software (Excel).

Introduction: SPSS (Statistical Package for Social Science) is a tool for the statistical analysis of data. It allows to perform a wide variety of statistical procedures. Main objective of the course is to provide participants with a basic knowledge of the program in order to be able to use it in a socio-economic context and in the exploration of corporate data.

Course Objective:

Upon successful completion of this course, the student should be able to:

- Understand the main features of SPSS /MATLAB
- Use the SPSS/MATLAB GUI effectively
- Perform descriptive analyses with SPSS /MATLAB
- Perform common parametric and non-parametric tests
- Perform simple regressions and multivariate analyses (factor and cluster)
- Know where to find help Audience The course is open to all Bocconi students.
- Undergraduate and Master of Science students with an interest in statistical analysis of data

Course outcome:

CO1. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.

CO2. Have basic knowledge on qualitative research techniques

CO3. Have adequate knowledge on measurement & scaling techniques as well as the quantitative data

analysis

CO4. Have basic awareness of data analysis-and hypothesis testing

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓					✓		✓	✓
CO2	✓	✓	✓	✓					✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓		✓		✓	✓
CO4	✓	✓	✓	✓		✓	✓		✓		✓	✓

Course Contents:

MODULE – I:

Data handling: open SPSS data file – save – import from other data source – data entry – labeling for dummy numbers - recode in to same variable – recode in to different variable – transpose of data – insert variables and cases – merge variables and cases.

MODULE –II:

Data handling: Split – select cases – compute total scores – table looks – Changing column – font style and sizes

MODULE – III:

Diagrammatic representation: Simple Bar diagram – Multiple bar diagram – Sub-divided Bar diagram - Percentage diagram - Pie Diagram – Frequency Table – Histogram – Scatter diagram – Box plot.

MODULE – IV:

Descriptive Statistics - Mean, Median, Mode, SD- Skewness- Kurtosis. Correlation – Karl Pearson's and Spearman's Rank Correlation, Regression analysis: Simple and Multiple Regression Analysis

MODULE – V:

Testing of Hypothesis: Parametric – One sample – Two sample Independent t – test – Paired t –test. Non – parametric: One sample KS test- Mann-Whitney U test – Wilcoxon Signed Rank test -Kruskal Wallis test – Friedman test- Chi- square test. Analysis of variance: One way and Two-way ANOVA.

Text Book:

1. Clifford E.Lunneborg (2000). Data analysis by resampling: concepts and applications. Dusbury Thomson learning. Australia.
2. Everitt, B.S and Dunn, G (2001). Applied multivariate data analysis. Arnold London.

Reference:

1. Jeremy J. Foster (2001). Data analysis using SPSS for windows. New edition. Versions 8-10. Sage publications. London.
2. Michael S. Louis – Beck (1995). Data analysis an introduction, Series: quantitative applications in the social sciences. Sage. Publications. London.

TITLE OF COURSE: BEHAVIORAL SCIENCES

COURSE CODE: CBC513

L-T-P: 1-0-0

CREDITS: 0.5

Pre-requisites: Basic idea of Behavioral science.

Course Outcomes:

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

CO1: Aspects of interpersonal communication and relationship

CO2: Process of Behavioral communication

CO3: Management of individual differences as important dimension of IPR

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												✓
CO2	✓						✓				✓	✓
CO3	✓										✓	✓
CO4									✓			✓

Course Contents:

Module I: Behavioural Communication

Scope of Behavioural Communication

Process – Personal, Impersonal and Interpersonal Communication

Guidelines for developing Human Communication skills

Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships

Principles

Types of issues

Approaches

Understanding and importance of self-disclosure

Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships

Conforming and Disconfirming Communication

Culturally Relevant Communication

Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication

Imperatives for Interpersonal Communication

Models – Linear, Interaction and Transaction

Patterns – Complementary, Symmetrical and Parallel

Types – Self and Other Oriented

Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development

Relationship circle – Peer/ Colleague, Superior and Subordinate

Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Text Books

1. Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
2. Julia T. Wood. Interpersonal Communication everyday encounter
3. Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell

References

1. Harvard Business School, Effective Communication: United States of America
2. Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

TITLE OF COURSE: DESIGN & ANALYSIS OF ALGORITHM

COURSE CODE: CBC514

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Students should have knowledge of Basic concepts in mathematics and programming languages.

Course Objective:

This course covers basic concepts of design and analysis of algorithm. The Topics are (Tentatively) include: Complexity Analysis, Divide and Conquer, Priority queue, Dynamic Programming, Branch and Bound, Backtracking, Greedy Method, Disjoint set manipulation, Lower bound Theory, Graph traversal algorithm, Network Flow, String matching problem, Amortize Analysis, Matrix Manipulation Algorithm, Notion of NP-completeness and Approximation Algorithms.

Course Outcomes:

The objective of the course is to get an overview of design and analysis of algorithms with an emphasis on the resource utilization in terms of time and space. Various techniques in development of algorithms will be implemented, so that the effect of problem size and architecture design on the efficiency of the algorithm is appreciated. Proving the correctness of the algorithms is one of the objectives for this course.

To reach this goal, the following objectives need to be met:

CO1. Understand the different complexity analysis according different problem. You will examine the algorithms used for various operations on operating systems.

CO2. Visualize different types of algorithm techniques. Become aware of the issues in the management of resources like processor, memory and input-output.

CO3. Know about lower bound concept of sorting techniques and different disjoint set manipulation.

CO4. Understand how to traverse a graph and the maximum flow of a network and also pattern matching of a text.

CO5. Understand the basic principle of different classes of problems like P, NP, and NP-complete.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										✓
CO2	✓	✓	✓	✓								✓
CO3	✓	✓	✓	✓		✓	✓		✓		✓	✓
CO4	✓	✓		✓		✓	✓		✓		✓	✓
CO5	✓	✓	✓	✓		✓						✓

Course Contents:

MODULE – I:

Complexity Analysis of an algorithm, Different Asymptotic notations – their mathematical significance

MODULE – II:

Basic method, use, Examples of Divide and Conquer algorithm, Dynamic Programming, Greedy Method, Branch and bound methods, Backtracking and their complexity.

MODULE – III:

Basic concept of Lower Bound Theory, Disjoint set manipulation, Amortized Analysis.

MODULE – IV:

Basic method and example of Graph traversal algorithm, String matching problem, Network Flow, Matrix Manipulation Algorithm.

MODULE – V:

Basic concept of Notion of NP-completeness, Approximation Algorithms.

Text Books

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, “Introduction to Algorithms”, 3rd edition, PHI.
2. Biswajit Bhowmik, “Design and analysis of algorithm”, 2nd edition, katson publication.

References

1. E. Horowitz and Shani “Fundamentals of Computer Algorithms”, 2nd edition, Orient Black Swan.
2. A. Aho, J. Hopcroft and J. Ullman “The Design and Analysis of computer Algorithms”, Pearson.

TITLE OF COURSE: DESIGN & ANALYSIS OF ALGORITHM LAB

COURSE CODE: CBC594

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Basic concepts in mathematics and c programming languages.

Introduction:

This course covers basic concepts of design and analysis of algorithm. The Topics to be covered (tentatively) include: Complexity Analysis, Divide and Conquer, Priority queue, Dynamic

Programming, Branch and Bound, Backtracking, Greedy Method, Disjoint set manipulation, Lower bound Theory, Graph traversal algorithm, Network Flow, String matching problem, Amortize Analysis, Matrix Manipulation Algorithm, Notion of NP-completeness and Approximation Algorithms.

Course Outcomes (CO):

The objective of the course is to get an overview of design and analysis of algorithms with an emphasis on the resource utilization in terms of time and space. Various techniques in development of algorithms will be implemented, so that the effect of problem size and architecture design on the efficiency of the algorithm is appreciated. Proving the correctness of the algorithms is one of the objectives for this course.

To reach this goal, the following objectives need to be met:

CO1: Understand the different complexity analysis according different problem. You will examine the algorithms used for various operations on operating systems.

CO2: Visualize different types of algorithm techniques. Become aware of the issues in the management of resources like processor, memory and input-output.

CO3: Know about lower bound concept of sorting techniques and different disjoint set manipulation.

CO4: Understand how to traverse a graph and the maximum flow of a network and also pattern matching of a text.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓						✓	✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓								✓
CO4	✓	✓	✓	✓								✓

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Turbo C or TC3 compiler in Windows XP or Linux Operating System

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1:

- >Implement Binary Search using Divide and Conquer approach
- > Implement Merge Sort using Divide and Conquer approach

Exercise No.2:

- >Implement Quick Sort using Divide and Conquer approach
- > Find Maximum and Minimum element from an array of integer using Divide and Conquer approach

Exercise No.3:

- >Find the minimum number of scalar multiplication needed for chain of matrix

Exercise No.4:

- >Implement all pair of Shortest path for a graph (Floyd Warshall Algorithm)

>Implement Single Source shortest Path for a graph (Bellman Ford Algorithm) Exercise No.5:

>Implement 15 Puzzle Problem

Exercise No.6:

>Implement 8 Queen Problem

>Graph Coloring Problem

Exercise No.7:

>Knapsack Problem or Job sequencing with deadlines

>Implement Single Source shortest Path for a graph (Dijkstra Algorithm) Exercise No.8: (implement any one of the following problem):

>Minimum Cost Spanning Tree by Prim's Algorithm

>Minimum Cost Spanning Tree by Kruskal's Algorithm

Exercise No.9: (implement any one of the following problem):

>Implement Breadth First Search (BFS)

>Implement Depth First Search (DFS) Exercise No.10:

>Implement Naïve algorithm for string matching.

Text Book:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, “Introduction to Algorithms”, 3rd edition, PHI.

2. E. Horowitz and Shani “Fundamentals of Computer Algorithms”, 2nd edition, Orient Black Swan.

TITLE OF COURSE: DATA COMMUNICATION & NETWORKING

COURSE CODE: CBC515

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Students should have knowledge of network and communication

Introduction:

Data communications refers to the transmission of this digital data between two or more computers and a computer network or data network is a telecommunications network that allows computers to exchange data. The physical connection between networked computing devices is established using either cable media or wireless media. The best-known computer network is the Internet.

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

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO1. Independently understand basic computer network technology and explain Data Communications System and its components.

CO2. Identify the different types of network topologies and protocols and numerate the layers of the

OSI model and TCP/IP. Explain the function(s) of each layer.

CO3. Identify the different types of network devices and their functions within a network and building the skills of subnetting and routing mechanisms.

CO4. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

CO5. Analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP.

Application:

1. To configure and implement network topology.
2. To configure and implement local area network.
3. To design network and assign IP address
4. Connect Remote computers
5. Analyze the network.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								✓
CO2	✓	✓	✓	✓	✓						✓	✓
CO3	✓	✓	✓	✓	✓				✓	✓	✓	✓
CO4	✓	✓	✓	✓							✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Contents:

MODULE – I: Introduction

Data communications: components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN); Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

Physical layer: Overview of data (analog & digital), signal (analog & digital), transmission (analog & digital) & transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network;

MODULE –II: Data link layer

Types of errors, framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

Medium access sub layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet;

MODULE –III: Network layer

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: Internet address, classful address, subnetting; Routing : techniques, static vs. dynamic routing, routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

MODULE –IV: Transport layer:

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.

MODULE –IV: Application layer

DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Modern topics:

ISDN services & ATM; DSL technology, Cable modem, SONET. Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.) “ – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, data Communication & Network, Vikas

Reference Books:

1. Kurose and Rose – “Computer networking -A top down approach featuring the internet” – Pearson Education
2. Leon, Garica, Widjaja – “Communication Networks” – TMH
3. Walrand – “Communication Networks” – TMH.
4. Comer – “Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)” – Pearson Education/PHI

TITLE OF COURSE: DATA COMMUNICATION & NETWORKING LAB

COURSE CODE: CBC595

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Basic idea of Mathematics, computer science, hardware, softwares etc.

Introduction:

This practical course provides students with hands on training regarding the design, troubleshooting, modeling and evaluation of computer networks. In this course, students are going to experiment in a real and simulation based test-bed networking environment, and learn about network design and troubleshooting topics and tools such as: network addressing, Address Resolution Protocol, basic troubleshooting tools (like ping, ICMP), IP routing (e.g. RIP), TCP and UDP, DHCP, ACL and many others. Student will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performance.

Course Outcomes (CO):

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

CO1: Build an understanding of the fundamental concepts of computer networking.

CO2: Familiarize the student with the basic taxonomy and terminology of the computer networking area.

CO3: Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

CO4: Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓
CO2	✓			✓								✓
CO3	✓	✓		✓		✓						✓
CO4	✓	✓	✓		✓	✓						✓

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Study of different types of Network cables and practically implements the cross- wired cable and straight through cable using clamping tool.

Exercise No. 2: Familiarization with some network devices. Exercise No. 3: Study of Network IP.

Exercise No. 4: Connect the computers in LAN. Exercise No. 5: Introduction to Packet Tracer.

Exercise No. 6: Configure network topology using packet tracer.

Exercise No. 7: Configure network topology using packet tracer to find the routing path by IPRoute Command.

Exercise No. 8: Network Configuration using distance vector routing protocol.

Exercise No. 9: Configuration of DHCP Protocol

Exercise No. 10: Telnet Configuration.

Exercise No. 11: Configuration of Access Control List.

Text Book:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH

Reference Book:

1. Authorized Self-Study Guide “Interconnecting Cisco Network Devices, Part 1(ICND1), 2nd Edition, January, 2008.

Recommended Systems/Software Requirements:

CAT-5/CAT-6 Cables, RJ 45, Cutter, Clamping Tool, Router, Switch and Hub.

Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.

Turbo C or TC3 compiler in Windows XP or Linux Operating System.

TITLE OF COURSE: Infrastructure Design
COURSE CODE: CBD504
L-T-P: 3-0-0
CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: CLOUD COMPUTING
COURSE CODE: CBD505
L-T-P: 3-0-0
CREDITS: 3

Pre-requisites: Students should have knowledge of computer networks and file sharing

Course Objective:

The course covers the fundamental concepts and practical aspects of Service Oriented Architecture. The current software development and delivery model is service oriented in nature. The applications are inherently getting distributed and shared by multiple clients. Thus, there is a need to get an insight into service oriented architectures.

Course Outcome (CO):

After having undergone the course, the student shall be able to understand the issues related with detailed design aspects and standards of SOA.

CO1. Outline the concept of Grid and Cloud Architectures.

CO2. Illustrate the data intensive grid service models and grid computing techniques

CO3. Demonstrate the concept of virtualization in cloud.

CO4. Experiment with the programming model for Hadoop and globus toolkit.

CO5. Interpret the security models in the grid and cloud environment.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓								
CO2	✓	✓	✓	✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓							

Course Contents:

MODULE –I:

SOA Fundamentals, Technologies, Benefits, Challenges and basic mechanisms associated with other computing service (Delivery models - SAS, IAS & PAS, Common Cloud deployment models and cloud characters), Security threats and mechanisms.

MODULE –II:

Introduction and fundamental of SOA, Benefits and Goals, SOA Manifesto, SOA and network management architecture, Service as web services, Discovery and publishing of web services, Service roles, Service models, Description of services with WSDL, Messaging with SOAP.

MODULE –III:

Exchange patterns of message, Service activity, Coordination, Composition, Types, Activation and registration process, Business activities, Orchestration, Composition of heterogeneous web services Choreography, Addressing, Reliable messaging, Correlation, Policies, Notification and eventing.

MODULE –IV:

Security threats and mechanisms, Essential techniques, Patterns, Security architecture for service oriented solutions, Infrastructure, Middleware, Multitenancy concepts.

Text Books

1. Service Oriented Architecture, Concepts Technology and Design, Thomas Erl, Pearson Education, 2008
2. SOA in Practice: The Art of Distributed System Design, Nicolai M. Josuttis, O'Reilly, 2007

TITLE OF COURSE: CLOUD COMPUTING & IOT LAB

COURSE CODE: CSC515

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Having basic knowledge of operating systems like Windows OS, Linux etc. As Visualization play a major role in AWS you need to have the understanding of it. Networking is an essential skill as all operations on cloud platform involves it.

Introduction:

The course covers the fundamental concepts and practical aspects of Service Oriented Architecture. The current software development and delivery model is service oriented in nature. The applications are inherently getting distributed and shared by multiple clients. Thus, there is a need to get an insight into service oriented architectures.

Course Outcomes (CO):

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

CO1: articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing

CO2: identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.

CO3: explain the core issues of cloud computing such as security, privacy, and interoperability.

CO4: choose the appropriate technologies, algorithms, and approaches for the related issues.

CO5: identify problems, and explain, analyze, and evaluate various IOT related solutions.

CO6: provide the appropriate cloud computing and IOT solutions and recommendations according to the applications used.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓

CO2	✓	✓		✓	✓							✓
CO3	✓		✓									✓
CO4	✓	✓		✓								✓
CO5	✓	✓		✓								✓
CO6	✓		✓		✓							✓

Course Contents:

1. Creating a Warehouse Application in Salesforce.com.
2. Creating an Application in Salesforce.com using Apex programming Language.
3. Implementation of SOAP Web services in C#/JAVA Applications.
4. Implementation of Para-Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S.
5. Installation and Configuration of Hadoop.
6. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
7. Case Study: PAAS (Facebook, Google App Engine)
8. Case Study: Amazon Web Services.
9. Recapitulation of Python.
10. Study and Install IDE of Arduino and different types of Arduino.
11. Write program using Arduino IDE for Blink LED.
12. Write Program for RGB LED using Arduino.
13. Study the Temperature sensor and Write Program for monitor temperature using Arduino.
14. Study and Implement RFID, NFC using Arduino.
15. Study and implement MQTT protocol using Arduino.
16. Study and Configure Raspberry Pi.
17. WAP for LED blink using Raspberry Pi.
18. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.

Text Books

1. Service Oriented Architecture, Concepts Technology and Design, Thomas Erl, Pearson Education, 2008
2. SOA in Practice: The Art of Distributed System Design, Nicolai M. Josuttis, O'Reilly, 2007
3. Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry, by Maciej Kranz, ISBN: 978-1-119-28566-3

References

1. Internet of Things, by RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan

TITLE OF COURSE: MICROPROCESSOR & MICROCONTROLLERS

COURSE CODE: ECC408

L-T-P: 2-0-2

CREDITS: 3

Pre-requisite: Knowledge is also assumed of basic concepts of computer organization and computer

architecture.

Introduction:

This course examines the basic concepts of digital number system, the evolution of general- purpose processor, concept of 8085, 8086 and 8051 its related programming. The basic concept of ARM and RISK processor. The Topics are (tentatively) include:

- Introduction of microcomputer-based system
- Architecture of 8085 and its pinout diagram
- Addressing mode and timing diagram of 8085
- Programming concept of 8051
- Serial and parallel data communication
- Architecture of 8086 and 8051 and its assembly language programming
- Architecture of ARM and RISC processor and its assembly language programming
- Memory and peripheral interfacing with different processor.

Course Outcomes (CO):

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

CO1. Students will be able to understand components of the computers, microprocessors and microcontrollers.

CO2. Students will be able to use 8085, 8086 and 8051 addressing modes, registers and instruction sets and writing program in assembly.

CO3. Students will be able to debug their assembly language programs.

CO4. Students will be able to program parallel input/output ports of 8085,8086 and 8051.

CO5. Students will be able to design memory systems, design memory system layout and analyse timing and electrical compatibility of the memory units.

CO6. Students will be able to understand more advanced processor like ARM and RISC processor.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓
CO2	✓	✓		✓	✓							✓
CO3	✓		✓									✓
CO4	✓	✓		✓								✓
CO5	✓	✓		✓								✓
CO6	✓		✓		✓							✓

Course Contents:

Module 1:

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors (with examples of 8085 and 8086);

Module 2:

Interfacing with peripherals - timer, serial I/O, parallel I/O, A/D and D/A converters; Arithmetic Coprocessors; System level interfacing design;

Module 3:

Concepts of virtual memory, Cache memory, advanced coprocessor Architectures- 286, 486, Pentium; Microcontrollers: 8051 systems,

Module 4:

Introduction to RISC processors; ARM microcontrollers interface designs

Text Books

1. Microprocessor architecture, programming and Application with 8085 – R. Gaonkar (Penram international Publishing LTD.)
2. Microcontrollers & RISC Architecture - by A.P. Godse (Technical Publications; FIRST edition (1 January 2011))
3. The 8051 microcontroller and embedded systems- Mazidi, Mazidiand Mc Kinley (PEARSON)
4. 8086 Microprocessor –K Ayala (Cengage learning)
5. Arm System-on-chip Architecture 2nd Edition 2nd Edition- Steve Furber

TITLE OF COURSE: MICROPROCESSOR & MICROCONTROLLERS LAB

COURSE CODE: ECC498

L-T-P: 0-0-2

CREDITS: 1

Pre-requisite: Knowledge is also assumed of basic concepts of computer organization and computer architecture.

Introduction:

The course is intended to create an appreciation for contemporary concepts in high performance mutli core super scalar architectures and appreciate their implementation in modern multi processors.

Course Outcomes (CO):

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

CO1. Students will be able to understand components of the computers, microprocessors and microcontrollers.

CO2. Students will be able to use 8085, 8086 and 8051 addressing modes, registers and instruction sets and writing program in assembly.

CO3. Students will be able to debug their assembly language programs.

CO4. Students will be able to program parallel input/output ports of 8085,8086 and 8051.

CO5. Students will be able to design memory systems, design memory system layout and analyze timing and electrical compatibility of the memory units.

CO6. Students will be able to understand more advanced processor like ARM and RISC processor.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓

CO2	✓	✓		✓	✓							✓
CO3	✓		✓									✓
CO4	✓	✓		✓								✓
CO5	✓	✓		✓								✓
CO6	✓		✓		✓							✓

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Introduction to 8085 Microprocessor.

Exercise No.2: a) Addition of 2 - 8 bit numbers

b) Subtraction of 2 - 8 bit numbers

Exercise No.3: a) Addition of 2 - 16 bit numbers

b) Subtraction of 2 - 16 bit numbers

Exercise No.4: a) Multiplication of 2 - 8 numbers b) Division of 2 - 8 bit numbers

Exercise No.5: a) Ascending order b) Descending order

Exercise No.6: Factorial of Given Numbers

Exercise No.7: To write an assembly language program to displace Fibanocci Series.

Text Books

1. MICROPROCESSOR architecture, programming and Application with 8085 - R. Gaonkar (Penram international Publishing LTD.)
2. Microcontrollers: Principles & Applications - Ajit Pal, PHI 2011.
3. The 8051 microcontroller and Embedded systems- Mazidi, Mazidi and McKinley (PEARSON)
4. 8086 Microprocessor –K Ayala (Cengage learning)

References

1. The 8085 Microprocessor, Architecture, Programming and Interfacing- K Uday Kumar, B.S Umashankar (Pearson)
2. The X-86 PC Assembly language, Design and Interfacing - Mazidi, Mazidi and Causey (PEARSON)
3. The 8051 microcontrollers – Uma Rao and AndhePallavi (PEARSON).

Recommended Systems/Software Requirements:

1. 8085 kit

TITLE OF COURSE: ESP & SDP-V

COURSE CODE: GSC505

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and English Language.

Introduction:

This course examines basic English language and math. The Topics are (tentatively): The course is

on GATE exam preparation, logical reasoning, English sentence correction, English, Grammar correction, basic arithmetic, Vocabulary, Verbal Reasoning.

Course Outcomes (CO):

In this course we will study the basic components of math and English language. Students are expected to be capable of understanding the better communication, their advantages and drawbacks, how to implement them in daily life, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know GATE exam preparation.

CO2: Students would be able to implement verbal and non-verbal communication.

CO3: By analyzing the logic of any arithmetic structure able to solve problem.

CO4: To become an efficient math and English language.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Section A: Employment Enhancement Skills-V

Stream wise GATE Preparation

Module-1: Programming in C.

Module-2: Programming and Data Structures

Module-3: Digital Logic Design & Computer Organization & Architecture

Module-4: Formal Language & Automata Theory

Module-5: Database Management Systems

Section B: Skill Development for Professional-V

Module-1: Vocabulary: Vocabulary questions test the candidate's knowledge in English like primary meanings of words, idioms, and phrases, secondary shades of meaning, usage, associated words, antonyms, etc.

Module-2: Grammar: Grammar-based questions test the candidate's capability to mark and correct grammatical errors. Prepositions use of modifiers, subject-verb agreement, parallel construction, phrasal verbs, redundancy, etc.

Module-3: Verbal Reasoning: Verbal Reasoning questions are designed to test the candidate's potential to identify relationships or patterns within sentences or a group of words.

Module-4: Inequalities, Coding – Decoding, Syllogisms, Ranking/ Ordering, Blood Relations,



Directions, Input-Output, Seating Arrangement, Puzzles , Decision Making, Analogy, Odd-Man out, Word Formation, Digit Sequence, Critical Reasoning, Statements & Assumptions, Statement & Conclusion, Strong Argument & Weak Arguments.

Learning Materials:

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON
4. Engineering mathematics-Pearson
5. GATE Mathematics- Willey/McGraw hill

Sixth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	CC	CBC616	Artificial Intelligence	3	0	2	4
2.	CC	CBC617	Financial & Cost Accounting	3	0	2	4
3.	DE	----	Discipline Specific Elective-II	3	0	2	4
4.	DE	----	Discipline Specific Elective-III	2	0	2	3
5.	GE	----	Design Thinking	2	0	2	3
6.	HSM	----	Business Communication & Value Science-V	3	0	0	3
7.	GSC	GSC606	ESP & SDP - VI	2	0	0	2
8.	NPT	NPT605	(NPTEL/MOOCs)	-	-	-	2
9.	MC	MC602	Disaster Management	0	0	0	0
10.	PTI	INT605	Internship Industrial Training/Project-IV	0	0	2	1
11.	MAR	MAR686	Mandatory Additional Requirements (MAR)	0	0	1	0.5
Total				18	0	12	26.5/30

##(NPT605): NPTEL courses are based on the respective year's offered course

#Students will undergo project/training/internship in the industry / research organization / reputed Institute during the vacation

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CBD606	Introduction Cryptography	3	0	2	4
2.	DE	CBD607	Network Security & Cryptography	3	0	2	4
3.	DE	CBD608	Information Security	3	0	2	4
4.	DE	CBD609	Robotics and Embedded Systems	2	0	2	3
5.	DE	CBD610	Modern Web Applications	2	0	2	3
6.	DE	CBD611	Enterprise Systems	2	0	2	3
7.	HSM	HSM609	Principle of Management	3	0	0	3
8.	HSM	HSM610	Total Quality Management	3	0	0	3

TITLE OF COURSE: ARTIFICIAL INTELLIGENCE

COURSE CODE: CBC616

L-T-P: 2-0-2

CREDITS: 3

Pre-requisites: Students should have knowledge of computer graphics, functions

Introduction:

In this course we will study the basic components of an intelligent system, their functions, mechanisms, policies and techniques used in their implementation and examples.

Course Outcomes:

CO1. Identify problems that are amenable to solution by AI methods.

CO2. Recognize appropriate AI methods to solve a given problem.

CO3. Discuss a given problem in the language/framework of different AI methods.

CO4. Develop basic AI algorithms.

CO5. Model an empirical evaluation of different algorithms on a problem for mutilation and state the conclusions that the evaluation supports.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								
CO2	✓	✓	✓	✓								
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Contents:

MODULE –I: Introduction to AI

Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI. Introduction of Intelligent Systems: Agents and Environments, Good Behavior: the concept of Rationality, The Nature of Environments, The structure of Agents, How the components of agent programs work.

MODULE –II: Problems Solving, Search and Control Strategies

Solving Problems by Searching, Study and analysis of various searching algorithms. Implementation of Depth-first search, Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bi-directional search Informed (Heuristic) Search Strategies: Greedy best-first search A* search: Minimizing the total estimated solution cost, Conditions for optimality: Admissibility and consistency, Optimality of A*, Memory-bounded heuristic search, Heuristic Functions, Generating admissible heuristics from sub problems: Pattern databases,

Learning heuristics from experience. Beyond Classical Search: Local Search Algorithms and Optimization Problems: Hillclimbing search Simulated annealing, Local beam search, Genetic algorithms, Local Search in Continuous Spaces, Searching with Non-deterministic Actions: AND-OR search trees, Searching with Partial Observations. Adversarial Search and Constraint Satisfaction Problems, Study of min-max algorithm Adversarial Search: Games, Optimal Decisions in Games, The mini-max algorithm, Optimal decisions in multiplayer games, Alpha--Beta Pruning, Move ordering, Imperfect Real-Time Decisions, Evaluation functions, Cutting off search, Forward pruning, Search versus lookup, Stochastic Games, Evaluation functions for games of chance, Partially Observable Games Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Variations on the CSP formalism, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, Alpha-beta pruning and CSP, Implementation aspects of minimax algorithm and CSP.

MODULE –III: Knowledge Representations Issues, Predicate Logic, Rules

Knowledge representation, KR using predicate logic, KR using rules. Reasoning System - Symbolic, Statistical: Reasoning, Symbolic reasoning, Statistical reasoning.

MODULE –IV: Quantifying Uncertainty, Learning Systems

Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, Other Approaches to Uncertain Reasoning, Rule-based methods for uncertain reasoning, representing vagueness: Fuzzy sets and fuzzy logic, Study of fuzzy logic and Decision trees, Implementation aspects of Decision trees. Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, The decision tree representation, Expressiveness of decision trees, inducing decision trees from examples.

MODULE –V: Expert Systems

Introduction, Knowledge acquisition, Knowledge base, working memory, Inference engine, Expert system shells, Explanation, Application of expert systems. Fundamentals of Neural Networks: Introduction and research history, Model of artificial neuron, Characteristics of neural networks, learning methods in neural networks, Singlelayer neural network system, Applications of neural networks. Fundamentals of Genetic Algorithms: Introduction, Encoding, Operators of genetic algorithm, Basic genetic algorithm.

Text Books

1. Rich, Elaine Knight, Kevin, Artificial Intelligence, Tata McGraw Hill.
2. Luger, George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education.

References

1. Nilsson, Nils J, Artificial Intelligence, Morgan Kaufmann.
2. Russell, Stuart J. Norvig, Peter, AI: A Modern Approach, Pearson Education

TITLE OF COURSE: FINANCIAL & COST ACCOUNTING

COURSE CODE: CBC617

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INTRODUCTION TO CRYPTOGRAPHY

COURSE CODE: CBD606

L-T-P: 3-0-0

COURSE CREDITS: 3

Pre-requisites: Students should have knowledge of computer networks.

Introduction:

With the growth of the Internet, the need for secured data transmission increased manifold. In fact it became a pre-condition to the usage of the Internet for business transaction. Therefore security is a major concern in the Internet World.

Objectives:

We will study security from multiple perspectives. We will consider a variety of security policies, authentication before access, integrity of information, and confidentiality of information. The course will focus on the models, the tools, and the techniques for enforcement of security policies, with some emphasis on the use of cryptography. And because today's implementation approaches are typically flawed, we will also address the penetration and disruption of information systems in the context of operating systems and networks.

Course Outcomes (CO):

CO1: Have a good understanding of how applications can communicate securely and what tools and protocols exist in order to offer different levels of security

CO2: Have detailed knowledge and the ability to critically analyze and design secure networks, applications and systems

CO3: Have a fundamental understanding of what makes systems vulnerable and be able to predict new attack methods before they become a reality

CO4: Have enough knowledge to evaluate protocols and ability to draw conclusions about the level of security they can offer

CO5: Understand what impact the selection of different protocols and security architectures can have to an application or a system

CO6: Have an understanding of research work in the field by reading conference and research reports in related areas

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓	✓	✓	✓	✓						✓
CO3	✓	✓		✓								✓
CO4	✓	✓	✓	✓	✓	✓						✓
CO5	✓	✓	✓	✓	✓	✓						✓
CO6	✓	✓	✓	✓	✓	✓		✓				✓

Course Contents:

Module 1: Attacks on Computers & Computer Security: Introduction, Need for Security, Security approaches, Principles of Security, Types of attack.

Module 2: Cryptography: Concepts & Techniques, Introduction, Plaintext & Cipher text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric key Cryptography, Key Range & Key Size

Module 3: Symmetric Key Algorithm Introduction, Algorithm types & Modes: Overview of Symmetric Key Cryptography, DES (Data Encryption Standard) algorithm, IDEA (International Data Encryption Algorithm) algorithm, RC5 (Rivest Cipher 5) algorithm.

Module 4: Asymmetric Key Algorithm, Digital Signature and RSA Introduction: Overview of Asymmetric key Cryptography, RSA algorithm, Symmetric & Asymmetric key Cryptography together, Digital Signature, Basic concepts of Message Digest and Hash Function (Algorithms on Message Digest and Hash function not required).

Module 5: Internet Security Protocols: User Authentication Basic Concepts, SSL protocol, Authentication Basics, Password, Authentication Token, Certificate based Authentication, Biometric Authentication

Module 6: Electronic Mail Security: Basics of mail security, Pretty Good Privacy, S/MIME.

Module 7: Firewall: Introduction, Types of firewall, Firewall Configurations, DMZ Network

Text Books:

1. “Cryptography and Network Security”, William Stallings, 2nd Edition, Pearson Education Asia
2. “Network Security private communication in a public world”, C. Kaufman, R. Perlman and M. Speciner, Pearson
3. Cryptography & Network Security: AtulKahate, TMH.

References:

1. “Network Security Essentials: Applications and Standards” by William Stallings, Pearson
2. “Designing Network Security”, MerikeKaeo, 2nd Edition, Pearson Books
3. “Building Internet Firewalls”, Elizabeth D. Zwicky, Simon Cooper, D. Brent Chapman, 2nd Edition, Oreilly
4. “Practical Unix & Internet Security”, SimsonGarfinkel, Gene Spafford, Alan Schwartz, 3rd Edition, Oreilly.

TITLE OF COURSE: NETWORK SECURITY & CRYPTOGRAPHY

COURSE CODE: CBD607

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Good knowledge of communication principles and protocols (TCP, IP, ICMP, ARP, etc.) You must have taken at least one communications course before this course. We also recommend

that you have taken the course Computer Security which shows how to think regarding security and discusses security issues in a wider perspective. Other relevant courses are Computer Networks and Cryptography which will make some topics easier to understand.

Introduction:

Network security consists of the policies and practices adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources.

Course Outcomes (CO):

CO1: Have a good understanding of how applications can communicate securely and what tools and protocols exist in order to offer different levels of security

CO2: Have detailed knowledge and the ability to critically analyze and design secure networks, applications and systems

CO3: Have a fundamental understanding of what makes systems vulnerable and be able to predict new attack methods before they become a reality

CO4: Have enough knowledge to evaluate protocols and ability to draw conclusions about the level of security they can offer

CO5: Understand what impact the selection of different protocols and security architectures can have to an application or a system

CO6: Have an understanding of research work in the field by reading conference and research reports in related areas

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓	✓	✓	✓	✓						✓
CO3	✓	✓		✓								✓
CO4	✓	✓	✓	✓	✓	✓						✓
CO5	✓	✓	✓	✓	✓	✓						✓
CO6	✓	✓	✓	✓	✓	✓		✓				✓

Course Contents:

Module 1: Introduction and Mathematical Foundations

Introduction to cryptography, Overview on Modern Cryptography, Number Theory, Probability and Information Theory

Module 2: Classical Cryptosystems

Cryptanalysis of Classical Cryptosystems, Shannon's Theory: I, Shannon's Theory: II, Shannon's Theory: III

Module 3: Symmetric Key Ciphers

Modern Block Ciphers (DES), Modern Block Cipher (AES), Modern Block Cipher (AES) contd.

Module 4: Cryptanalysis of Symmetric Key Ciphers

Linear Cryptanalysis, Differential Cryptanalysis, Other Cryptanalytic Techniques, Overview on S-Box Design Principles, Modes of operation of Block Ciphers

Module 5: Stream Ciphers and Pseudorandomness

Stream Ciphers, Pseudorandom functions

Module 6: Hash Functions and MACs Hash functions:

The Merkle Damgard Construction, Message Authentication Codes (MACs)

Module 7: Asymmetric Key Ciphers:

Construction and Cryptanalysis, More Number Theoretic Results, The RSA Cryptosystem, Primality Testing, Factoring Algorithms, Other attacks on RSA and Semantic Security of RSA, The Discrete Logarithm Problem (DLP) and the Diffie Hellman Key Exchange algorithm, The ElGamal Encryption Algorithm, Cryptanalysis of DLP

Module 8: Digital Signatures

Signature schemes: I, Signature schemes: II

Module 9: Modern Trends in Asymmetric Key Cryptography

Elliptic curve based cryptography: I, Elliptic curve based cryptography: II

Module 10: Network Security Secret Sharing Schemes

A Tutorial on Network Protocols, Kerberos, Pretty Good Privacy (PGP), Secure Socket Layer (SSL), Intruders and Viruses, Firewalls.

Text Books

1. William Stallings: Cryptography and Network Security, seventh edition ISBN 978-1-292-15858-7 or sixth edition ISBN 978-0-273-79335-9.

Reference Book

1. "Network Security Essentials: Applications and Standards" by William Stallings, Pearson

TITLE OF COURSE: NETWORK SECURITY & CRYPTOGRAPHY LAB**COURSE CODE: CBD697****L-T-P: 0-0-2****CREDITS: 1**

Pre-requisite: Good knowledge of communication principles and protocols (TCP, IP, ICMP, ARP, etc.) You must have taken at least one communications course before this course. We also recommend that you have taken the course Computer Security which shows how to think regarding security and discusses security issues in a wider perspective. Other relevant courses are Computer Networks and Cryptography which will make some topics easier to understand.

Introduction:

Network security consists of the policies and practices adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources.

Course Outcomes (CO):

CO1: Have a good understanding of how applications can communicate securely and what tools and protocols exist in order to offer different levels of security

CO2: Have detailed knowledge and the ability to critically analyze and design secure networks, applications and systems

CO3: Have a fundamental understanding of what makes systems vulnerable and be able to predict new attack methods before they become a reality

CO4: Have enough knowledge to evaluate protocols and ability to draw conclusions about the level

of security they can offer

CO5: Understand what impact the selection of different protocols and security architectures can have to an application or a system

CO6: Have an understanding of research work in the field by reading conference and research reports in related areas

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓	✓	✓	✓	✓						✓
CO3	✓	✓		✓								✓
CO4	✓	✓	✓	✓	✓	✓						✓
CO5	✓	✓	✓	✓	✓	✓						✓
CO6	✓	✓	✓	✓	✓	✓		✓				✓

Course Contents:

Experiment 1: Network Scanning

Experiment 2: iptables, the Linux Firewall

Experiment 3: Initial Report & Peer-Review

Experiment 4: OpenSSL

Experiment 5: Network Intrusion Detection

Experiment 6: Cryptanalysis of Symmetric Key Ciphers

Experiment 7: Asymmetric Key Ciphers

Experiment 8: Digital Signatures

Experiment 9: Classical Cryptosystems

Experiment 10: Network Security Secret Sharing Schemes

Text Books

1. William Stallings: Cryptography and Network Security, seventh edition ISBN 978-1-292-15858-7 or sixth edition ISBN 978-0-273-79335-9.

TITLE OF COURSE: INFORMATION SECURITY

COURSE CODE: CBD608

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: ROBOTICS AND EMBEDDED SYSTEMS

COURSE CODE: CBD609

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: MODERN WEB APPLICATIONS

COURSE CODE: CBD610

L-T-P: 2-0-2

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: ENTERPRISE SYSTEMS

COURSE CODE: CBD611

L-T-P: 2-0-2

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–V

COURSE CODE: HSMyyy

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: PRINCIPLE OF MANAGEMENT

COURSE CODE: HSM609

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Determine issues of ethics, planning, goal setting, and effective decision-making processes.

Introduction:

This course deals with the principles of Management within workplace. Students understand the intricacies of management that operates to extract work from the employees. Students dig into topics like:

- Basic concepts of Management
- Functions of Management
- Structure of Management
- How management and society are interlinked
- People Management
- Leadership concepts
- Quantitative methods
- Customer relations

Course Outcomes (CO):

This course briefs students on the mode of operandi for the employees and the mechanism tool for

job at a workplace. Furthermore the handling of customers is an integral part of the course. This subject deals with the growth of an individual as an employee.

CO1: Learning the various modes of operations for the management.

CO2: Customer handling and taking care of their needs and requirements keeping in mind the basic infrastructure of the company.

CO3: Managing people and their mode of work.

CO4: Understanding leadership skills that leads to growth of an individual.

CO5: Understanding the link between society and management and how to maintain a balance between the two.

CO6: Company's responsibility towards the society through CSR and Quantitative Methods.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								✓		✓	✓	✓
CO2						✓		✓	✓	✓	✓	✓
CO3						✓		✓	✓	✓	✓	✓
CO4		✓						✓	✓	✓	✓	✓
CO5						✓		✓		✓	✓	✓
CO6			✓			✓	✓	✓		✓	✓	✓

Course Contents:

Module-1: Basic concepts of Management: Definition, essence, Functions, Roles, Level Functions of Management Planning: Concept, Nature, Types, Analysis, Management, objectives
Structure: Concept, Structure, Principles, Centralization, Decentralization, Spn of Management, Organizational Effectiveness

Module-2: Management and Society: Concept, external environment, CSR, Corporate Governance, and Ethical Standards. People Management: Overview, Job design, Recruitment and Selection, Stress Management Managerial competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, and Entrepreneurship.

Module-3: Leadership concept: Nature, Styles, Decision Making, Process, Tools and Techniques. Economic, Financial and quantitative Analysis : Production Markets, National Income Accounting, Financial Function, and goals, Financial statements, Ratio Analysis. Quantitative Methods: Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control

Module-4: Customer Management: Market planning and research, Market Mix, Advertising and Brand Management. Operations and Technology Management: Production and Operations Management, Logistics, & supply chain Management. TQM, Kaizen and Six Sigma, MIS.

Text Book:

1. "Management" by Stoner J A and Freeman R E
2. "Great Ideas in Management" by Parkinson C N and Rustomji M K and Sapre S A
3. "Management Principles and Practices" by Lallan Prasad and S S Gulshan

References:

1. "Management: Principles and Practice" by S K Mandal
2. "Principles and Practices of Management" by Khusboo Manoj

TITLE OF COURSE: TOTAL QUALITY MANAGEMENT

COURSE CODE: HSM610

L-T-P: 3-0-0

CREDITS: 3

Pre-requisites: Students should have knowledge of work management

Course Objective:

Total quality management concepts include the Quality & Management Philosophies, Managing Quality and control, Managing Quality and control and TQM tools.

Course Outcomes:

This course will serve to broaden the student's understanding of the issues and latest developments in the area of total quality management. To reach this goal, the following objectives need to be met:

1. Define the current state of total quality management.
2. Understand the Quality & Management Philosophies.
3. Become familiar with Managing Quality and control and Familiar with TQM Tools.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓								✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Contents:

MODULE-I: Introduction

Definition of Quality, Small q & Big Q, Quality characteristics- weaves, Dimensions, determinants, Quality Planning, Quality & profitability - idea, Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE-II: Quality & Management Philosophies

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement: Deming Philosophy- Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Demings wheel. Juran Philosophy- 10 steps for quality improvement, quality trilogy, and universal breakthrough sequence. Crosby Philosophy- Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

MODULE-III: Managing Quality and control

Traditional vs. Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve. Objectives of quality control, seven tools of quality, Strategy & policy. Company wise quality control. Quality Assurance-

Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, Concept of six sigma, New seven Management tools

MODULE-IV: TQM Tools

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD)–House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA

MODULE-V: Quality Systems

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

Text Books:

1. Total Quality Management, Poonia & Sharma, Khanna Publishing House
2. Total Quality Management, Gopal, PHI
3. Dale H.Besterfield, et al., “Total Quality Management”, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.
4. James R.Evans & William M.Lindsay, “The Management and Control of Quality”, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5
5. Zeiri. “Total Quality Management for Engineers”, Wood Head Publishers, 1991.

TITLE OF COURSE: ESP & SDP-VI

COURSE CODE: GSC606

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and English Language.

Introduction:

This course examines basic English language and math. The Topics are (tentatively): The course is on GATE exam preparation, logical reasoning, English sentence correction, English, Grammar correction, basic arithmetic, Vocabulary, Verbal Reasoning.

Course Outcomes (CO):

In this course we will study the basic components of math and English language. Students are expected to be capable of understanding the better communication, their advantages and drawbacks, how to implement them in daily life, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know GATE exam preparation.

CO2: Students would be able to implement verbal and non-verbal communication.

CO3: By analyzing the logic of any arithmetic structure able to solve problem.

CO4: To become an efficient math and English language.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓

CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Section A: Employment Enhancement Skills-VI

Stream wise GATE Preparation

Module-1: Software Engineering.

Module-2: Computer Networks

Module-3: Digital Logic Design & Computer Organization & Architecture

Module-4: Operating System

Section B: Skill Development for Professional-VI

Module-1

Revision and Advanced Problems in Quantitative Aptitude

- 1) Numbers (+, -, x, etc), Percentages, Ratio, Partnership, Linear Equations, Profit & Loss
- 2) Averages, Mixtures & Allegations, Number System, Time and Work
- 3) Simple & Compound Interest, Other / Misc Quantitative Apt., Indices and Surds, Quadratic Equations
- 4) Permutations & Combinations, Probability, Geometry, Mensuration
- 5) Data Interpretation, Various Charts, Diagrams, Tables

Module-2

Revision and Advanced Problems in Reasoning

- 1) Coding, Series & Numbers, Blood Relations, Analogy
- 2) Cubes, Data Sufficiency, Non-Verbal Reasoning
- 3) Syllogisms, Puzzles, Machine I/O, Inequality
- 4) Seating Arrangement, Calendar / Clock
- 5) Statements, Other / Misc Logical Reasoning, Decision Making (Ethics)

Module-3

Revision and Advanced Questions in Verbal English

- 1) Grammar,
- 2) Clauses,
- 3) Spotting errors,
- 4) Sentence Correction,
- 5) Blanks,
- 6) Reading Comprehensions,
- 7) Vocabulary

Newspaper reading: The Hindu & Economic Times.

Learning Materials:

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON
4. Engineering mathematics-Pearson
5. GATE Mathematics- Willey/McGraw hill

TITLE OF COURSE: DISASTER MANAGEMENT

COURSE CODE: MC602

L-T-P: 0-0-0

Credits: 0

Pre-requisites: Students should have knowledge of environmental science

Introduction:

Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

Course Outcomes:

CO1. Develop an understanding of the key concepts, definitions a key perspective of All Hazards Emergency Management

CO2. Understand the Emergency/Disaster Management Cycle REVISED

CO3. Have a basic understanding for the history of Emergency management

CO4. Develop a basic under understanding of Prevention, Mitigation, Preparedness, Response and Recovery

CO5. Develop a basic understanding for the role of public and private partnerships

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓									✓	
CO2	✓										✓	
CO3	✓	✓		✓	✓	✓					✓	
CO4	✓	✓		✓	✓	✓					✓	
CO5	✓			✓	✓	✓					✓	

Course Contents:

MODULE-I: Introduction

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

MODULE-II: Repercussions of Disasters and Hazards

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

MODULE-III: Disaster Prone Areas in India

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

MODULE-IV: Disaster Preparedness and Management

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data From Meteorological and other Agencies, Media Reports: Governmental And CommModuley Preparedness.

MODULE-V: Risk Assessment

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

MODULE-VI: Disaster Mitigation

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Suggested reading

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies 'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

Seventh Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	CC	CBC718	Services Science & Service Ops Management	3	0	2	4
2.	CC	CBC719	Usability Design of Software Application	3	0	2	4
3.	CC	CBC720	Financial Management	3	0	0	3
4.	DE	----	Discipline Specific Elective-IV	3	0	2	4
5.	DE	----	Discipline Specific Elective-V	3	0	0	3
6.	HSM	----	Business Communication & Value Science-VI	3	0	0	3
7.	GSC	GSC707	ESP & SDP - VII	2	0	0	2
8.	PTI	INT706	Internship Industrial Training/Project-V	0	0	6	3
Total				17	0	12	26/29

#Students will undergo project/training/internship in the industry / research organization / reputed Institute during the vacation

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CBD712	Cognitive Science & Analytics	3	0	0	3
2.	DE	CBD713	Introduction to IoT	3	0	0	3
3.	DE	CBD714	Industry Offered Elective	3	0	0	3
4.	DE	CBD715	Mobile Computing	3	0	2	4
6.	DE	CBD716	Cloud, Micro-Services & Application	3	0	2	4
7.	DE	CBD717	Advanced Social, Text and Media Analytics	3	0	0	3
8.	HSM	HSM711	Professional Practice, Law & Ethics	3	0	0	3
9.	HSM	HSM712	Organizational Behavior	3	0	0	3
10.	HSM	HSM713	Human Resource Development and Organizational Behavior	3	0	0	3



TITLE OF COURSE: SERVICES SCIENCE & SERVICE OPS MANAGEMENT

COURSE CODE: CBC718

L-T-P: 3-0-2

CREDITS: 4

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: USABILITY DESIGN OF SOFTWARE APPLICATION

COURSE CODE: CBC719

L-T-P: 3-0-2

CREDITS: 4

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: FINANCIAL MANAGEMENT

COURSE CODE: CBC720

L-T-P: 1-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: Cognitive Science & Analytics

COURSE CODE: CBD712

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INTRODUCTION TO IOT

COURSE CODE: CBD713

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INDUSTRY OFFERED ELECTIVE

COURSE CODE: CBD714

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: MOBILE COMPUTING

COURSE CODE: CBD715

L-T-P: 3-0-2

CREDITS: 4

Pre-requisites: Students should have knowledge of computer networks, layer

Introduction:

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link.

Course Objective:

To make the student understand the concept of mobile computing paradigm, its novel applications and limitations. To understand the typical mobile networking infrastructure through a popular GSM protocol and the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer, the database issues in mobile environments & data delivery models.

Course Outcomes:

CO1. Able to think and develop new mobile application.

CO2. Able to take any new technical issue related to this new paradigm and come up with a solution(s).

CO3. Able to develop new ad hoc network applications and/or algorithms/protocols.

CO4. Able to understand & develop any existing or new protocol related to mobile environment

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓	✓	✓						✓	✓
CO2	✓	✓	✓	✓	✓						✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Course Contents:

MODULE – I: Introduction

Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

MODULE – II:

Wireless Medium Access Control (MAC):



Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Mobile Network Layer:

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

MODULE – III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

MODULE -IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

MODULE -V

Mobile Adhoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

Textbooks:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772.

Reference Books:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002, ISBN 0471419028.
3. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, ISBN: 0521817331, Cambridge University Press, Oct 2004.

TITLE OF COURSE: CLOUD, MICRO-SERVICES & APPLICATION

COURSE CODE: CBD716

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: ADVANCED SOCIAL, TEXT AND MEDIA ANALYTICS

COURSE CODE: CBD717

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: PROFESSIONAL PRACTICE, LAW & ETHICS

COURSE CODE: HSM710

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–VI

COURSE CODE: HSMyyy

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: ORGANIZATIONAL BEHAVIOR

COURSE CODE: HSM712

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic knowledge of general Management

Introduction:

Students in this course learn to get accustomed to workplace and they understand how to keep going in this world called profession. This course teaches them to be more confident and the theories which talks about the basic survival within the professional world.

Course Outcomes (CO):

CO1: Learning about organization

CO2: Personality development

CO3: Job satisfaction and factors responsible for the same

CO4: Motivation factors in profession, Group behavior

CO5: Communication process, Organizational politics, handling stress

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1						✓		✓				✓
CO2						✓		✓	✓	✓		✓
CO3						✓		✓		✓	✓	✓
CO4						✓		✓	✓	✓	✓	✓
CO5				✓		✓		✓	✓	✓	✓	✓

Course Contents:



Module 1:

i) Organizational Behavior: Introduction, Concept, Features, Foundation, Importance ii) Perception: Definition, Nature and Importance, Factors influencing Perception, Perceptual Selectivity, Link between Perception and Decision Making iii) Motivation: Concept, Models of motivation, Types of Motivation

Module 2:

iv) Personality and Attitudes: Meaning of personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction
v) Individual Decision Making in Organization: Rational Decision making, Decision making style, Common biases and judgment error in decision making

Module 3:

vi) Group Behavior: Characteristics of Group, Types of Groups, Stages of Group Development, Group Decision Making
vii) Leadership: Definition, Importance, Leadership Styles
viii) Technological Changes and Behavior: Introduction, Technology and occupation, computerization, TQM, Reengineering, Flexible system

Module 4:

ix) Organizational Design: Various Organizational Structures and their Effects on Human Behavior Concepts of Organizational Climate and Organizational Culture
x) Conflict Management: Traditional vis-a-vis Modern View of Conflict, Functional and Dysfunctional Conflict, Conflict Process, Negotiation – Bargaining Strategies, Negotiation Process
xi) Stress Management: Concept, forms, stages, causes, Effects, Coping strategies

Text Books

1. Robbins, S. P. & Judge, T.A.: Organizational Behavior, Pearson Education, 15th Edn. Resources, PHI, 10th Edn.
2. A Textbook of Organizational Behaviour Paperback –by Gupta C.B. 1st Edition published on 1 Jan 2014
3. Organizational Behaviour: M. N. Mishra. Vikas Publishing House Pvt Ltd.

References

1. http://bba12.weebly.com/uploads/9/4/2/8/9428277/organizational_behavior_15e_-_stephen_p_robbins_timothy_a_judge_pdf_qwerty.pdf
2. Cole, G. A.: Organizational Behaviour: Theory and Practice. Thomson Publication
<https://books.google.co.in/books?id=K5EKfJaZqgwC&printsec=frontcover&dq=organizational+behavior&hl=en&sa=X&ved=0ahUKEwiZgr30mZLVAhXCE5QKHXYqDgYQ6AEIPjAE#v=onepage&q&f=false>

TITLE OF COURSE: HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOR
COURSE CODE: HSM713

L-T-P: 3-0-0

CREDITS: 3

Pre-Requisites: Students should have knowledge of work management, employee performance analysis

Introduction:

During the study of this course, student would come to know about the theory and application of

human resource management, the broad range of influences acting on human resource management, about the human resources planning and policies through its information system, training and development of human capital of the organization. This course emphasis on the knowledge of performance assessment methods, improvements and resultant in terms of employee service condition reviews. Compensation and workers participation in management including the discipline matters and strategic human resources management

Course Outcome:

During the study of this course, student would come to know about the theory and application of human resource management, the broad range of influences acting on human resource management, about the human resources planning and policies through its information system, training and development of human capital of the organization. This course emphasis on the knowledge of performance assessment methods, improvements and resultant in terms of employee service condition reviews. Compensation and workers participation in management including the discipline matters and strategic human resources management

CO1. Deal with HRM/HRP efficiently in the real business life to ensure efficient human resources.

CO2. Conduct job analysis and scientific recruitment and selection process for the higher productivity.

CO3. Contribute towards organizational growth by designing and implementing appropriate training and development program

CO4. Develop relevant and objective performance appraisal and compensation system to meet individual and organizational strategic needs.

CO5. Effectively handle disciplinary and grievance mechanisms to ensure stability and smooth functioning of the organization

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓		✓							
CO2	✓	✓										
CO3			✓	✓								
CO4		✓			✓							
CO5			✓	✓								

Course Contents:

MODULE- I: Introduction

Human resources in Organizations, role of Human Resource Management; the historical background, personnel Management, Human Resource Development, Typical Organizational setup of a Human Resource Management department.

MODULE- II: Human Resource Planning

Supply and Demand Forecasting methods, Manpower Inventory, Career Planning, Succession Planning, Personnel Policy, Human Resource Information System (HRIS), Recruitment and Selection: Process, Sources, Methods of selection, Interviewing Method, Skills and Errors Performance Appraisal Systems: Purpose, Methods, Appraisal instruments, 3600 Appraisal HR Score Card, Errors in appraisal, Potential Appraisal, Appraisal Interview.

MODULE-III: Human Resource Development

Policy and Programs, Assessment of HRD Needs, HRD, Methods: Training and Non-Training. Compensation Management: Wages- Concepts, Components; System of Wage Payment, Fringe Benefits, Retirement Benefit.

MODULE- IV: Workers' Participation in Management

Concept, Practices and Prospects in India, Quality Circles and other Small Group Activities. Discipline Management: Misconduct, Disciplinary action, Domestic Enquiry, Grievance Handling

MODULE- V: Strategic HRM

Meaning, Strategic HRM vs Traditional HRM, SHRM Process, Nature of e-HRM, e-Recruitment & Selection ,e-Performance Management, e-Learning

Reference Books:

1. Agarwala T.-Strategic Human Resource Management, OUP
2. Aswathappa,K.-Human Resource Management, Tata McGraw Hill
3. JyothiP. &Venkatesh, D. N.-Human Resource, Management

TITLE OF COURSE: ESP & SDP-VII

COURSE CODE: GSC707

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and English Language.

Introduction:

The course is on GATE exam preparation, revision and advanced problems in quantitative aptitude, reasoning, Verbal English etc.

Course Outcomes (CO):

In this course we will study the basic components of math and English language. Students are expected to be capable of understanding the better communication, their advantages and drawbacks, how to implement them in daily life, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know GATE exam preparation.

CO2: Students would be able to implement verbal and non-verbal communication.

CO3: By analyzing the logic of any arithmetic structure able to solve problem.

CO4: To become an efficient math and English language.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Section A: Employment Enhancement Skills-VII

Module-1

Stream wise GATE & IES syllabus.

Section B: Skill Development for Professional-VII

Module-1

Miscellaneous Problems on Verbal English [CAT level-4].

Module-2

Miscellaneous Problems on quantitative aptitude [CAT level-4].

Module-3

Miscellaneous Problems on Logical Reasoning [CAT level 4].

Newspaper reading: The Hindu & Economic Times.

Learning Materials:

1. Fastrack objective Arithmetic: Arihant
2. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
3. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON
4. Engineering mathematics-Pearson
5. GATE Mathematics- Willey/McGraw hill

Eighth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	CC	CBC821	Marketing Research & Marketing Management	3	0	0	3
2.	DE	---	Discipline Specific Elective-IV	3	0	0	3
3.	HSM		Business Communication & Value Science-VII	3	0	0	3
4.	GSC	GSC808	ESP & SDP - VIII	2	0	0	2
5.	PTI	INT807	Internship Industrial Training/Project-VI	0	0	8	4
6.		CSG801	Grand Viva	0	0	0	3
Total				11	0	8	18/19

#Students will undergo project/training/internship in the industry / research organization / reputed Institute during the vacation

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CBD818	Advanced HR	3	0	0	3
2.	DE	CBD819	Business Strategy	3	0	0	3
3.	DE	CBD820	IT Project Management	3	0	0	3
4.	DE	CBD821	Advanced Finance	3	0	0	3
5.	DE	CBD822	Industry Offered Elective -II	3	0	0	3
6.	DE	CBD823	Financial Modeling	3	0	0	3
7.	HSM	HSM814	Industrial Psychology	3	0	0	3
8.	HSM	HSM815	Organizational Behavior	3	0	0	3



TITLE OF COURSE: MARKETING RESEARCH & MARKETING MANAGEMENT

COURSE CODE: CBC821

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: Advanced HR

COURSE CODE: CBD818

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: Business Strategy

COURSE CODE: CBD819

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: IT Project Management

COURSE CODE: CBD820

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: Advanced Finance

COURSE CODE: CBD821

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: Financial Modeling

COURSE CODE: CBD823

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: BUSINESS COMMUNICATION & VALUE SCIENCE–VIII

COURSE CODE: HSMyyy

L-T-P: 3-0-0

CREDITS: 3

As per guideline by TCS (Will be updated shortly)

TITLE OF COURSE: INDUSTRIAL PSYCHOLOGY

COURSE CODE: HSM805

L-T-P: 3-0-0

CREDITS: 3

Pre-requisites: Students should have knowledge of interview, evaluation process

Introduction:

The industrial psychology course is concerned with the application of psychological theories and principles to organizations. It focuses on increasing efficiency, productivity, and related issues as the physical and mental well-being of employees at industrial organizations.

Course Outcomes:

After having the course, students are expected to:

CO1. Perform a thorough and systematic competency model (job analysis), Validate and develop a job specific selection design

CO2. Understand how to design, develop, and evaluate job specific training program

CO3. Explain organizational recruitment, selection and retainment and Evaluate the work performance of employees

CO4. Explaining the organizational issues including teams, attitudes, and occupational health and Describe the motivating factors of employees

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CO1	✓					✓			✓			
CO2		✓	✓		✓				✓	✓		
CO3		✓		✓		✓						
CO4	✓		✓	✓			✓			✓		

Course Contents:

MODULE-I: Introduction to Industrial/Organizational Psychology

Describing Industrial / Organizational Psychology and what I/O psychologist do. The history of I/O psychology. Research in I/O psychology. Ethics in I/O psychology

MODULE-II: Job Analysis and Evaluation

Job analysis and job evaluation

MODULE-III: Legal Issues and Employee Selection

The legal process. Determining whether an Employment decision is legal. Harassment. Family medial leave act. Affirmative action. Privacy issues.

MODULE-IV: Employee Selection: recruiting and interviewing

Job analysis, recruitment, realistic job previews, effective employee selection techniques, employment interviews, job search skills.

MODULE-V: Employee Selection: references and testing

Predicting performance using references and letter of recommendation. Performance using applicant training and education. Performance using applicant knowledge, ability, skill, prior experience, personality and interest and character. Performance limitations due to medical and psychological problems. Comparison techniques

MODULE-VI: Evaluating Selection Techniques and Decisions

Characteristics of effective selection techniques. Establishing the usefulness of a selection device. Determining the fairness of a test. Making the hiring decision.

Text Books:

1. "Industrial/Organizational Psychology, 6th Edition, 2010", Authors: Michael G. Aamodt, Publisher: Cengage Learning, ISBN: 978-0-495-60106-7.

TITLE OF COURSE: ESP & SDP - VIII

COURSE CODE: GSC808

L-T-P: 2-0-0

CREDITS: 2

Pre-requisite: Basic concepts in mathematics and English languages.

Introduction:

This course examines current event of national importance. The Topics are (tentatively): The course is on Mock tests of UPSC Prelims CSAT-I & UPSC CSAT-II etc, Indian & World Geography, Indian Polity & Governance, Economic & Social Development, General issues on Environmental ecology.

Course Outcomes (CO):

In this course we will study the basic components of world Geography. Students are expected to be capable of understanding the Indian Polity & Governance, their advantages and drawbacks, how to implement them in Economic & Social Development, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know Indian Economic & Social system.

CO2: Students would be able to know Indian Polity & Governance.

CO3: By analyzing the logic of national importance and policy.

CO4: To become an efficient citizen of India.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Employment Enhancement Skills-VIII

Module-1

Stream wise GATE, IES, UPSE syllabus

Mock tests of IES, UPSC Prelims CSAT-I

Skill Development for Professional-VIII

Module-1: Current events of National & International importance, History of India & Indian National Movement.

Module-2: Indian & World Geography – Physical, Social, Economic Geography of India & the World.

Module-3: Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, etc.

Module-4: Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, etc.

Module-5: General issues on Environmental ecology, Bio-diversity & climate change – that do not require subject specialization. General Science

TITLE OF COURSE: Organizational Behavior

COURSE CODE: HSM815

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic knowledge of general Management

Introduction:

Students in this course learn to get accustomed to workplace and they understand how to keep going in this world called profession. This course teaches them to be more confident and the theories which talks about the basic survival within the professional world.

Course Outcomes (CO):

CO1: Learning about organization

CO2: Personality development

CO3: Job satisfaction and factors responsible for the same

CO4: Motivation factors in profession, Group behavior

CO5: Communication process, Organizational politics, handling stress

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓		✓				✓
CO2						✓		✓	✓	✓		✓
CO3						✓		✓		✓	✓	✓
CO4						✓		✓	✓	✓	✓	✓
CO5				✓		✓		✓	✓	✓	✓	✓

Course Contents:

Section A: Employment Enhancement Skills-VIII

Module-1

Stream wise GATE, IES, UPSE syllabus

Mock tests of IES, UPSC Prelims CSAT-I

Section B: Skill Development for Professional-VIII

Module-1: Current events of National & International importance, History of India & Indian National Movement.

Module-2: Indian & World Geography – Physical, Social, Economic Geography of India & the World.

Module-3: Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, etc.

Module-4: Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, etc.

Module-5: General issues on Environmental ecology, Bio-diversity & climate change – that do not require subject specialization. General Science.