



| Semester -I | | | | | | | | | | | | |
|------------------------------------|---------------------------------|-----------|------------|----------|-----------|-----------|---------------|---------|----------|-------------|-------|--|
| Code | Subject | Cr | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | | |
| | | | L | T | P | | MS1 | MS2 | END TERM | IA | Total | |
| Theory | | | | | | | | | | | | |
| 101 | Engineering Mathematics-I | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 102 | Engineering Physics | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 103 | Communication Skills | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 104 | Programming For Problem Solving | 3 | 4 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 105 | Basic Electrical Engineering | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| Practicals & Sessionals | | | | | | | | | | | | |
| Code | Subject | Cr | Hrs. /Week | | | Exam Hrs. | IA (60%) | | EA (40%) | Total | | |
| | | | L | T | P | | MP1 30% | MP2 30% | | | | |
| 106 | Engineering Physics Lab | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | | |
| 107 | Language Lab | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | | |
| 108 | Computer Programming Lab | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | | |
| 109 | Basic Electrical Lab | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | | |
| 110 | Computer Aided Engg.Graphics | 2 | 0 | 0 | 3 | 3 | 30 | 30 | 40 | 100 | | |
| Grand Total | | 27 | 18 | 6 | 11 | | | | | 1000 | | |



| Semester -II | | | | | | | | | | | |
|------------------------------------|---------------------------------|-----------|------------|-----------|-----------|-----------|---------------|---------|----------|-------------|-------|
| Code | Subject | Cr | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | |
| | | | L | T | P | | MS1 | MS2 | END TERM | IA | Total |
| Theory | | | | | | | | | | | |
| 201 | Engineering Mathematics-II | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 202 | Engineering Chemistry | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 203 | Human Values | 3 | 4 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 204 | Basic Mechanical Engineering | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 205 | Basic Civil Engineering | 2 | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| Practicals & Sessionals | | | | | | | | | | | |
| Code | Subject | Cr | Hrs. /Week | | | Exam Hrs. | IA (60%) | | EA (40%) | Total | |
| | | | L | T | P | | MP1 30% | MP2 30% | | | |
| 206 | Engineering Chemistry Lab | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | |
| 207 | Human Values Activities | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | |
| 208 | Manufacturing Practice Workshop | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | |
| 209 | Basic Civil Engineering Lab | 2 | 0 | 0 | 3 | 3 | 30 | 30 | 40 | 100 | |
| 210 | Computer Aided Machine Drawing | 2 | 0 | 0 | 2 | 2 | 30 | 30 | 40 | 100 | |
| Grand Total | | 27 | 18 | 06 | 11 | | | | | 1000 | |



SUNRISE UNIVERSITY, ALWAR

BLOCK CHAIN TECHNOLOGY

DEPARTMENT

2ND YEAR

SEMESTER - III

| Code | Subject | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | |
|----------------------------------|---|------------|----|----|-----------|---------------|-------------|-------------|-------|-------|
| | | L | T | P | | MS1 | MS2 | END TERM | IA | Total |
| Theory | | | | | | | | | | |
| 3BTBT01 | Mathematics-III (Differential Calculus) | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 3BTBT02 | Data Structure & Algorithms | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 3BTBT03 | Analog Electronic Circuits | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 3BTBT04 | Digital Electronics | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 3BTBT05 | Organizational Behavior | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 3BTBT06 | Values and Ethics in Profession | 4 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| Practicals&Sessionals | | | | | | | | | | |
| Code | Subject | Hrs. /Week | | | Exam Hrs. | IA (60%) | | EA (40%) | Total | |
| | | L | T | P | | MP1* 30% | MP2* 30% | Pr.W 40% | | |
| 3BTBT07 | IT Workshop | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 3BTBT08 | Humanities-I | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 3BTBT09 | ESP & SDP-III | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 3BTCE10 | Mandatory Additional Requirements (MAR) | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| GRAND TOTAL | | 18 | 06 | 08 | | | | | 1000 | |



SUNRISE UNIVERSITY, ALWAR

BLOCK CHAIN TECHNOLOGY

DEPARTMENT

2ND YEAR

SEMESTER - IV

| Code | Subject | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | |
|----------------------------------|--|------------|----|----|-----------|---------------|----------|----------|-------|-------|
| | | L | T | P | | MS1 | MS2 | END TERM | IA | Total |
| Theory | | | | | | | | | | |
| 4BTBT01 | Discrete Mathematics | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 4BTBT02 | Operating System | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 4BTBT03 | Design & Analysis of Algorithms | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 4BTBT04 | Computer Organization & Architecture | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 4BTBT05 | Signals & System | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 4BTBT06 | Management-I | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| Practicals&Sessionals | | | | | | | | | | |
| Code | Subject | Hrs. /Week | | | Exam Hrs. | IA (60%) | | EA (40%) | Total | |
| | | L | T | P | | MP1* 30% | MP2* 30% | Pr.W 40% | | |
| 4BTBT07 | ESP & SDP-IV | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 4BTBT08 | Environmental Sciences/Disaster Management | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 4BTBT09 | Mandatory Additional Requirements (MAR) | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 4BTBT10 | Human Resource Development and Organizational Behavior | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| GRAND TOTAL | | 16 | 06 | 08 | | | | | 1000 | |



SEMESTER – V

| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | | |
|------------------------------------|--|-----|------------|----|----|-----------|---------------|----------|----------|-------|-------|--|
| | | | L | T | P | | MS1 | MS2 | END TERM | IA | Total | |
| Theory | | | | | | | | | | | | |
| 5BTBT01 | Formal Language & Automata Theory | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 5BTBT02 | Data Base Management System | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 5BTBT03 | Object Oriented Programming Using Java | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 5BTBT04 | Software Engineering | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 5BTBT05 | Embedded Systems | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 5BTBT06 | AI & Machine Learning | 2 | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| Practicals & Sessionals | | | | | | | | | | | | |
| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | IA(60%) | | EA (40%) | Total | | |
| | | | L | T | P | | MP1* 30% | MP2* 30% | Pr.W 40% | | | |
| 5BTBT07 | ESP & SDP-V | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 5BTBT08 | Internship/Project-I | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 5BTBT09 | Humanities-II | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 5BTBT10 | Industrial Psychology | | | | | | | | | 100 | | |
| | GRAND TOTAL | 25 | 17 | 06 | 08 | | | | | 1000 | | |



SEMESTER

- VI

| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | | |
|------------------------------------|---|-----|------------|----|----|-----------|---------------|----------|----------|-------|-------|--|
| | | | L | T | P | | MS1 | MS2 | END TERM | IA | Total | |
| Theory | | | | | | | | | | | | |
| 6BTBT01 | Blockchain Technology | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 6BTBT02 | Soft Computing | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 6BTBT003 | AI & Machine Learning | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 6BTBT04 | Big Data Analytics | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 6BTBT05 | Numerical Methods & Operation Research | 2 | 2 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| 6BTBT06 | Operations Research | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 | |
| Practicals & Sessionals | | | | | | | | | | | | |
| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | IA(60%) | | EA (40%) | Total | | |
| | | | L | T | P | | MP1* 30% | MP2* 30% | Pr.W 40% | | | |
| 6BTBT07 | Chain survey | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 6BTBT08 | ESP & SDP-VI | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 6BTBT09 | Internship/Industrial Training/Project-II | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| 6BTBT10 | Discipline Elective-I | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | | |
| | GRAND TOTAL | 25 | 17 | 06 | 08 | | | | | 1000 | | |



SEMESTER – VII

| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | |
|------------------------------------|--|-----------|------------|-----------|-----------|-----------|---------------|----------|-----------|------------|-------|
| | | | L | T | P | | MS1 | MS2 | END TER M | IA | Total |
| Theory | | | | | | | | | | | |
| 7BTBT01 | Natural Language Processing | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 7BTBT02 | Digital Forensics | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 7BTBT03 | Neural Network and Application | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| Practicals & Sessionals | | | | | | | | | | | |
| Code | | CR. | Hrs. /Week | | | Exam Hrs. | IA(60%) | | EA (40%) | Total | |
| | | | L | T | P | | MP1* 30% | MP2* 30% | Pr. W 40% | | |
| 7BTBT04 | ESP & SDP-VII | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 7BTBT05 | Internship/Industrial Training/Project-III | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| | GRAND TOTAL | 27 | 17 | 06 | 10 | | | | | 500 | |



SEMESTER

- VIII

| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | Maximum Marks | | | | |
|-------------------------|---|-----|------------|----|----|-----------|---------------|----------|-----------|-------|-------|
| | | | L | T | P | | MS1 | MS2 | END TERM | IA | Total |
| 8BTBT01 | Digital Forensics | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 8BTBT02 | Deep Learning | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| 8BTBT03 | Data Mining & Data Ware Housing | 3 | 3 | 1 | 0 | 3 | 10 | 10 | 60 | 20 | 100 |
| Practicals & Sessionals | | | | | | | | | | | |
| Code | Subject | CR. | Hrs. /Week | | | Exam Hrs. | IA(60%) | | EA (40%) | Total | |
| | | | L | T | P | | MP1* 30% | MP2* 30% | Pr. W 40% | | |
| 8BTBT04 | ESP & SDP - VIII | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| 8BTBT05 | Internship Industrial Training/Project-IV | 2 | 0 | 0 | 2 | 3 | 30 | 30 | 40 | 100 | |
| | GRAND TOTAL | 30 | 11 | 05 | 10 | | | | | 500 | |

101EngineeringMathematics-I

| SN | CONTENTS | Hours |
|--------------|--|-----------|
| 1 | Calculus: Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. | 8 |
| 2 | SequencesandSeries: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions. | 6 |
| 3 | FourierSeries: Periodic functions, Fourier series, Euler's formula, Change of intervals,Half range sine and cosine series, Parseval's theorem. | 6 |
| 4 | MultivariableCalculus(Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence. | 10 |
| 5 | MultivariableCalculus(Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes. | 10 |
| TOTAL | | 40 |



| SN | CONTENTS | Hours |
|----|--|-------|
| 1 | WaveOptics: Newton's Rings, Michelson's Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg's Law. | 9 |
| 2 | QuantumMechanics: Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes. | 6 |
| 3 | CoherenceandOpticalFibers: Spatial and temporal coherence: Coherence length; Coherence time and 'Q' factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber. | 4 |
| 4 | Laser: Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, Amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine. | 6 |
| 5 | MaterialScience&SemiconductorPhysics: Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications. | 7 |
| 6 | IntroductiontoElectromagnetism: Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Bio-Savart law, Divergence and curl of static magnetic field, Faraday's law, Displacement current and magnetic field arising from time dependent electric field, Maxwell's equations, Flow of energy and Poynting vector. | 8 |



| | | |
|--|--------------|-----------|
| | TOTAL | 40 |
|--|--------------|-----------|

103: Communication Skills

SunRise University



| SN | CONTENTS | Hours |
|--------------|---|-----------|
| 1 | Communication: Meaning, Importance and Cycle of Communication. Media and Types of Communication. Verbal and Non-Verbal Communication. Barriers to communication. Formal and Informal Channels of Communication (Corporate Communication). Divisions of Human Communication and Methods to improve Interpersonal Communication. Qualities of good communication. | 7 |
| 2 | Grammar: Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions) | 7 |
| 3 | Composition: Job Application and Curriculum-Vitae Writing. Business Letter Writing. Paragraph Writing. Report Writing. | 7 |
| 4 | Short Stories: “Luncheon” by Somerset Maugham. “How Much Land Does a Man Need?” by Count Leo Tolstoy. “The Night Train at Deoli” by Ruskin Bond. | 7 |
| 5 | Poems: “No Men are Foreign” by James Kirkup. “If” by Rudyard Kipling. “Where the Mind is without Fear” by Rabindranath Tagore. | 75 |
| TOTAL | | 35 |



104: Programming for Problem Solving

| SN | CONTENTS | Hours |
|--------------|---|-----------|
| 1 | Fundamentals of Computer: Stored program architecture of computers, Storage device- Primary memory, and Secondary storage, Random, Direct, Sequential access methods, Concepts of High-level, Assembly and Low-level languages, Representing algorithms through flowchart and pseudo code. | 12 |
| 2 | Numbers system: Data representations, Concepts of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to r2, r's and (r-1)'s complement, Binary addition, Binary subtraction, Representation of alphabets. | 12 |
| 3 | C Programming: Problem specification, flow chart, data types, assignment statements, input output statements, developing simple C programs, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, development of C programs using above statements, Arrays, functions, parameter passing, recursion, Programming in C using these statements, Structures, files, pointers and multi file handling. | 12 |
| TOTAL | | 36 |

105: Basic Electrical Engineering



| SN | CONTENTS | Hours |
|--------------|--|-----------|
| 1 | DCCircuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Series-Parallel circuits, Node voltage method, Mesh current method, Superposition, Thevenin's, Norton's and Maximum power transfer theorems. | 8 |
| 2 | ACCircuits: Representation of sinusoidal waveforms, peak and r.m.s values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections. | 8 |
| 3 | Transformers: Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency. | 6 |
| 4 | ElectricalMachines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor, single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators. | 6 |
| 5 | PowerConverters: Semiconductor PN junction diode and transistor (BJT). Characteristics of SCR, power transistor and IGBT. Basic circuits of single phase rectifier with R load, Single phase Inverter, DC-DC converter. | 6 |
| 6 | ElectricalInstallations: Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption. | 6 |
| TOTAL | | 40 |



- 1 To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4. Determination of band gap using a P-N junction diode.
5. To determine the height of given object with the help of sextant.
6. To determine the dispersive power of material of a prism with the help of spectrometer.
7. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted).
8. To determine the coherence length and coherence time of laser using He – Ne laser.
9. To measure the numerical aperture of an optical fibre.
10. To study the Hall Effect and determine the Hall Voltage and Hall coefficients.

107:LanguageLab

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing.
5. Listening comprehension.

108:ComputerProgrammingLab

1. To learn about the C Library, Preprocessor directive, Input-output statement.
2. Programs to learn data type, variables, If-else statement
- 3 Programs to understand nested if-else statement and switch statement
4. Programs to learn iterative statements like while and do-while loops
5. Programs to understand for loops for iterative statements
6. Programs to learn about array and string operations
7. Programs to understand sorting and searching using array
8. Programs to learn functions and recursive functions
9. Programs to understand Structure and Union operation
- 10 Programs to learn Pointer operations
11. Programs to understand File handling operations
- 12 Programs to input data through Command line argument

109:BasicElectricalEngineeringLab

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



2. Transformers:
Observation of the no-load current waveform on an oscilloscope. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
3. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side.
4. Demonstration of cut-out sections of machines: dc machine (commutator- brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.
5. Torque Speed Characteristic of separately excited dc motor.
6. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

110: ComputerAidedEngineeringGraphics Lab

Introduction: Principles of drawing, lines, type of lines, usage of Drawing instruments, lettering, Conic sections including parabola, hyperbola, Rectangular Hyperbola (General method only); Scales-Plain, Diagonal and Vernier Scales.

ProjectionsofPoint&Lines: Position of Point, Notation System, Systematic Approach for projections of points, front view & Top view of point, Position of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book).

ProjectionofPlanes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both the RPs, True shape of the plane, Distance of a point from plane, Angle between two planes.

ProjectionsofRegularSolids: frustum and truncated solids, those inclined to both the Planes- Auxiliary Views.

SectionofSolids: Theory of sectioning, section of prisms and cubes, section of pyramids and Tetrahedron section of Cylinders, section of cones, section of spheres (One drawing sheet, one assignment in sketch book)

OverviewofComputerGraphics: Covering theory of CAD software [such as: The menu System, Toolbars (standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of lines, Planes, Simple and compound Solids.

201: Engineering Mathematics-II

| SN | CONTENTS | Hours |
|----|----------|-------|
|----|----------|-------|



| | | |
|--------------|--|-----------|
| 1 | Matrices: Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation. | 10 |
| 2 | First order ordinary differential equations: Linear and Bernoulli's equations, Exact equations, Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type. | 6 |
| 3 | Ordinary differential equations of higher orders: Linear Differential Equations of Higher order with constant coefficients, Simultaneous Linear Differential Equations, Second order linear differential equations with variable coefficients: Homogenous and Exact forms, one part of CF is known, Change of dependent and independent variables, method of variation of parameters, Cauchy-Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations. | 12 |
| 4 | Partial Differential Equations–First order: Order and Degree, Formation; Linear Partial differential equations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit's method, Standard forms. | 6 |
| 5 | Partial Differential Equations–Higher order: Classification of Second order partial differential equations, Separation of variables method to simple problems in Cartesian coordinates including two dimensional Laplace, one dimensional Heat and one dimensional Wave equations. | 6 |
| TOTAL | | 40 |

**Chemistry**

| SN | CONTENTS | Hours |
|----|---|-------|
| 1 | Water: Common impurities, hardness, determination of hardness by complexometric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process. | 10 |
| 2 | Organic Fuels: Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann by-product oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulong's formula, proximate analysis & ultimate and combustion of fuel. | 10 |
| 3 | Corrosion and its control: Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design. | 3 |
| 4 | Engineering Materials: Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point. | 10 |
| 5 | Organic reaction mechanism and introduction of drugs: Organic reaction mechanism: Substitution; SN ₁ , SN ₂ , Electrophilic aromatic substitution in benzene, free radical halogenations of alkanes, Elimination; elimination in alkyl halides, dehydration of alcohols, Addition: electrophilic and free radical addition in alkenes, nucleophilic addition in aldehyde and ketones, Rearrangement; Carbocation and free radical rearrangements Drugs : Introduction, Synthesis, properties and uses of Aspirin, Paracetamol | 7 |



203: Human Values

| SN | CONTENTS | Hours |
|----|--|-------|
| 1 | <p>Course Introduction-Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, Self Exploration - its content and process; 'Natural Acceptance' and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels</p> | 5 |
| 2 | <p>Understanding Harmony in the Human Being- Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha Understanding the Body as an instrument of 'I', Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.</p> | 5 |
| 3 | <p>Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman), meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, harmony in the society, Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.</p> | 5 |
| 4 | <p>Understanding Harmony in the Nature and Existence- Whole existence as Coexistence Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence</p> | 5 |



| | | |
|--------------|--|-----------|
| 5 | <p>ImplicationsoftheaboveHolisticUnderstandingofHarmonyonProfessionalEthics.Natu ralacceptanceofhumanvalues Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems, technologies and management models. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. Case studies related to values in professional life and individual life.</p> | 5 |
| TOTAL | | 25 |

204: Basic Mechanical Engineering

| SN | CONTENTS | Hours |
|----|---|-------|
| 1 | <p>Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers classification and types of steam boilers and steam turbines. Introduction and Classification of power plants.</p> | 7 |
| 2 | <p>PumpsandICEngines: Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.</p> | 7 |
| 3 | <p>RefrigerationandAirConditioning: Introduction, classification and types of refrigeration systems and air- conditioning. Applications of refrigeration and Air-conditioning.</p> | 7 |
| 4 | <p>TransmissionofPower: Introduction and types of Belt and Rope Drives, Gears.</p> | 7 |



| | | |
|--------------|--|-----------|
| 5 | Primary Manufacturing Processes: Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering. | 7 |
| 6 | Engineering Materials and Heat Treatment of Steel: Introduction to various engineering materials and their properties. | 5 |
| TOTAL | | 40 |

205: Basic Civil Engineering

| SN | CONTENTS | Hours |
|----|---|-------|
| 1 | Introduction to objective, scope and outcome of the subject | |
| 2 | Introduction: Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country. | 8 |
| 3 | Surveying: Object, Principles & Types of Surveying; Site Plans, Plans & Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying, Bearings and Longitude & Latitude of a Line, Introduction to total station. Levelling: Instrument used, Object of levelling, Methods of levelling in brief, Contour maps. | 8 |
| 4 | Buildings: Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation. | 8 |
| 5 | Transportation: Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures. | 8 |



| | | |
|---|---|-----------|
| 6 | Environmental Engineering: Environmental Pollution, Environmental Acts and Regulations, Functional Concepts of Ecology, Basics of Species, Biodiversity, Ecosystem, Hydrological Cycle; Chemical Cycles: Carbon, Nitrogen & Phosphorus; Energy Flow in Ecosystems Water Pollution: Water Quality standards, Introduction to Treatment & Disposal of Waste Water. Reuse and Saving of Water, Rain Water Harvesting. Solid Waste Management: Classification of Solid Waste, Collection, Transportation and Disposal of Solid. Recycling of Solid Waste: Energy Recovery, Sanitary Land fill, On-Site Sanitation. Air & Noise Pollution: Primary and Secondary air pollutants, Harmful effects of Air Pollution, Control of Air Pollution. . Noise Pollution, Harmful Effects of noise pollution, control of noise pollution, Global warming & Climate Change, Ozone depletion, Green House effect | 8 |
| | TOTAL | 40 |

206: Engineering Chemistry Lab

1. Determination the hardness of water by EDTA method
2. Determination of residual chlorine in water
3. Determination of dissolved oxygen in water
4. Determination of the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution by using diphenyl amine indicator
5. Determination of the strength of $CuSO_4$ solution iodometrically by using hypo solution
6. Determination of the strength of $NaOH$ and Na_2CO_3 in a given alkali mixture
7. Proximate analysis of Coal
8. Determination of the flash & fire point and cloud & pour point of lubricating oil
9. Determination of the kinematic viscosity of lubricating oil by Redwood viscometer no. 1 at different temperature
10. Synthesis of Aspirin/ Paracetamol

207: Human Values Activities Lab

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.

PS 2:



Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion? On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:

(i) What is 'Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?

(ii) What is 'naturally Acceptable' to you - to nurture or to exploit others? Is your living in accordance with your natural acceptance or different from it?

2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time: Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of

PS6:

1. Chalk out some programs towards ensuring your harmony with the body - in terms of nurturing, protection and right utilization of the body.

2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';



1a. Do I want to make myself happy? 2a. Do I want to make the other happy?
3a. Does the other want to make himself/herself happy? 4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

1b. Am I able to always make myself happy? 2b. Am I able to always make the other happy?

3b. Is the other able to always make himself/herself happy? What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.

2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or beliefs.

PS9:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.

2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS10:

List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analyse and explain the aspect of mutual fulfillment of each unit with other orders.

PS11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS12:

Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basis of natural acceptance of human values. If so, how should one proceed in this direction from

PS 13:

1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.

2. Propose a broad outline for humanistic Constitution at the level of Nation.

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core message of this course grasped by you. How has this affected you in terms of;

- Thought
- Behavior
- Work and



d. Relization

What practical steps are you able to visualize for the transition of the society from its present state.

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work i.e. social work at villages adopted by respective institute/ college.

208: Manufacturing Practices Workshop

Carpentry Shop

1. T – Lap joint
2. Bridle joint

Foundry Shop

3. Mould of any pattern
4. Casting of any simple pattern

Welding Shop

5. Lap joint by gas welding
6. Butt joint by arc welding
7. Lap joint by arc welding
8. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice

9. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop

10. Finishing of two sides of a square piece by filing
11. Making mechanical joint and soldering of joint on sheet metal
12. To cut a square notch using hacksaw and to drill a hole and tapping

209: Basic Civil Engineering Lab

1. Linear Measurement by Tape:
 - a) Ranging and Fixing of Survey Station along straight line and across obstacles.
 - b) Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of lines using Surveyor's and Prismatic compass
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
 - a) To determine the reduced levels in closed circuit.
 - b) To carry out profile levelling and plot longitudinal and cross sections for road by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.



supply Fittings.

7. To determine the pH and total solids of the given sample of sewage.
8. To study various Sanitary Fittings.

210:Computer Aided Machine Drawing Lab

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning. Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems covering Principles of Orthographic Projections.

Sectional views of mechanical components: (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners and other mechanical components: (Free hand sketch) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, type of rivets, types of riveted joints etc. Bearing: Ball, roller, needle, foot step bearing. Coupling: Protected type, flange, and pin type flexible coupling. Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Overview of Computer Graphics: (2 drawing sheets) Covering theory of CAD software such as: The menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of Lines, Planes, Simple and compound Solids.

TITLE OF COURSE: Fundamentals of Block chain
COURSE CODE:
L-T-P: 3-0-0
CREDITS: 3

Pre-requisite: Basic concepts in networking.

Introduction:

- The students should be able to understand a broad overview of the essential concepts of blockchain technology.
- To familiarize students with Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming.
- Students should be able to learn about different types of blockchain and consensus algorithms.

Course Outcomes (CO):

After completion of this course, students would be able:

CO1: To explain the basic notion of distributed systems.

CO2: To use the working of an immutable distributed ledger and trust model that defines blockchain.

CO3: To illustrate the essential components of a blockchain platform.

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 1

Basics: The Double-Spend Problem, Byzantine Generals’ Computing Problems, Public-Key Cryptography, Hashing, Distributed Systems, Distributed Consensus.

Module 2

Technology Stack: Blockchain, Protocol, Currency.

Bitcoin Blockchain: Structure, Operations, Features, Consensus Model, Incentive Model.

Module 3

Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.

Module 4

Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types

of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.

Module 5

Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposit-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management.

Text Books

1. Kirankalyan Kulkarni, Essentials of Bitcoin and Blockchain, Packt Publishing.
2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House.
3. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons.
4. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Imran Bashir, Packt Publishing (2017)

References

1. Blockchain: Blueprint for a New Economy by Melanie Swan, Shroff Publisher O'Reilly Publisher Media; 1st edition (2015).
2. Mastering Bitcoin: Programming the Open Blockchain by Andreas Antonopoulos.

Corresponding Online Resources:

1. <https://www.coursera.org/specializations/blockchain>.
2. <https://nptel.ac.in/courses/106105184/>
3. Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview

TITLE OF COURSE: Smart Contracts and Solidity

COURSE CODE: BC602

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Basic concepts in networking.

Introduction:

1. Students should be able to understand the concept of smart contracts related to blockchain.
2. Students should be able to understand the smart contract higher-level language Solidity and apply it to create smart contracts.
3. Students should be able to learn Truffle IDE for creating and deploying a DApp.

Course Outcomes (CO):

After completion of course, students would be able to:

CO1: To understand the working and importance of smart contracts.

CO2: To learn the solidity language required for coding Ethereum smart contracts.

SunRise University

CO3: To create and deploy a DApp on a Ethereum test 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 | ✓ | ✓ | ✓ | | | | | | | | | ✓ |

Course Contents:

Module 1

Smart Contracts: Definition and Need, Features of Smart Contracts, Life Cycle of a Smart Contract, Introduction to Ethereum Higher-Level Languages.

Module 2

Development Environment: Building A Simple Smart Contract with Solidity, Solc-Compiler, Ethereum Contract ABI, Remix-IDE for Smart Contract Development.

Module 3

Introduction to Solidity: Contracts, Constructors & Functions, Variables, Getters & Setters, Arrays, Memory vs Storage, Mappings in Solidity

Advanced Solidity: Structs, Error Handling & Restrictions, Libraries, Global Variables in Solidity, Abstract Contracts, Inheritance, And Interfaces, Events

19

Module 4

Truffle Framework & Ganache: Environment Setup for Truffle & Ganache, Truffle Project Creation, Truffle Compile, Migrate and Create Commands.

Module 5

Decentralized App Creation: Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.

Text Books

1. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons.
2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House.

References

1. Building Blockchain Projects, Narayan Prusty, Packt Publishing.
2. Mastering Ethereum: Building Smart Contracts and Dapps Book by Andreas Antonopoulos and Gavin Wood, Shroff Publisher/O'Reilly Publisher.

Corresponding Online Resources:

1. <https://www.coursera.org/learn/smarter-contracts>

2. <https://www.udemy.com/course/solidity-smart-contracts-build-dapps-inethereum-blockchain/>

3. Introduction to Blockchain Technology and Applications,

SunRise University

https://swayam.gov.in/nd1_noc20_cs01/preview

TITLE OF COURSE: Blockchain Platforms and Use cases

COURSE CODE: BC603

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in networking.

Introduction:

- Students should be able to learn different types of blockchain platforms.
- Students should be able to understand different types of Decentralized applications developed using blockchain technology.
- Students should be able to understand several types of blockchain use cases.

Course Outcomes (CO):

After completion of course, students would be able to:

CO1: To distinguish between different types of blockchain platforms.

CO2: To understand different types of uses of blockchain and apply it to some real-life scenarios accordingly.

CO3: To learn about the shortcomings of blockchain technology and their corresponding solutions.

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 1

Permissioned Blockchains: Hyperledger Fabric Services, Model and Functions, Hyperledger Composer, Microsoft Azure Blockchain Platform and Services, Other Platforms: IOTA, TRON, Ziliqa, Cosmos, Ripple.

20

Module 2

Decentralized Application Platforms: Augur-Decentralised Prediction Market Platform, Grid+-Energy Ecosystem Platform.

Module 3

SunRise University

Challenges and Solutions Related to Blockchain: Consensus, Scalability, Privacy and Confidentiality, Escrow, and Multi signature.

Module 4

Alternative Decentralized Solutions: Interplanetary File System (IPFS) Working and Uses, Hashgraph- Working, Benefits, And Use-Cases.

Module 5

Blockchain Use Cases: Financial Services Related Use Cases, Revolutionization of Global Trade, Digital Identity, Auditing Services, Supply Chain Management, Healthcare Related Services, Blockchain and IOT, Blockchain and AI.

Text Books

1. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons.
2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House.
3. Building Blockchain Projects, Narayan Prusty, Packt Publishing.

References

1. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Imran Bashir, Packt Publishing (March 17, 2017).
2. Blockchain: Blueprint for a New Economy by Melanie Swan, Shroff Publisher publisher/O'Reilly Publisher Media; 1st edition (2015).

Corresponding Online Resources:

1. <https://nptel.ac.in/courses/106105184/>
2. <https://www.coursera.org/learn/blockchain-platforms>.
3. Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview.

TITLE OF COURSE: Blockchain Security and Performance

COURSE CODE: BC704

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Basic concepts in networking.

Introduction:

Students should be able to understand the security and performance-related issues of blockchain.

- Students should be able to learn techniques and tools to tackle the security related issues of blockchain.
- Students should be able to learn new approaches required for enhancing blockchain

performance.

Course Outcomes (CO):

SunRise University

After completion of course, students would be able to:

CO1: To understand the security and performance perspective of blockchain technology.

CO1: To learn and apply security analysis and performance-enhancing techniques related to blockchain.

CO1: To understand the real-life applications of blockchain technology and apply it to provide solutions to some real-life problems.

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 1

Security Issues: Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues, Real-Life Attacks on Blockchain Applications/ Smart Contracts, Trusted Execution Environments.

Module 2

Security Tools for Smart Contracts: Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure Key Management, Quantum Resilience Keys.

Module 3

Performance Related Issues: Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications.

Module 4

Performance Improvements: Off-Chain State Channels, Sidechains, Parallels Chains, Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, Atomic Swaps Between Smart Contracts.

Module 5

Blockchain Applications: Decentralized Cryptocurrency, Distributed Cloud Storage, EVoting, Insurance Claims, Cross-Border Payments, Asset Management, Smart Appliances.

Text Books

1. Mastering Ethereum: Building Smart Contracts and Dapps Book by Andreas Antonopoulos and Gavin Wood, Shroff Publisher/O'Reilly Publisher.

22

Corresponding Online Resources:

1. <https://www.edx.org/course/blockchain-and-fintech-basics-applications-and-limitations>

TITLE OF COURSE: Blockchain and FinTech

COURSE CODE: BC705

L-T-P: 3-0-2

CREDITS: 4

Pre-requisite: Basic concepts in networking.

Introduction:

- Students should be able to understand the benefits of using blockchain in financial sector.
- Students should understand how decentralized nature of blockchain is impacting banking and financial sector.
- Students should learn blockchain regulations and future trends related to blockchain to be used in financial sector.

Course Outcomes (CO): After completion of course, students would be able to:

CO1: To understand difference between different types of coins and tokens related to blockchain technology.

CO2: To understand the benefits of blockchain in banking sector.

CO3: To understand the concept of decentralized markets.

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 1

Cryptocurrencies: Concept, Cryptocurrency Mining, Uses of Cryptocurrencies, Tokens, Token vs Crypto Coin, Concept of ICOs (Initial Coin Offerings), Benefits of Using ICOs, STOs (Security token offerings), ICO vs STO, Cryptocurrency wallets.

Module 2

Decentralized Finance (DeFi): Concept, Benefits and Risks Associated with DeFi, Centralized vs Decentralized finance, DeFi Projects, DeFi future trends.

Module 3

Decentralized Markets: Concept of Decentralized markets, impact of decentralization on financial market, Decentralized Exchanges (DEX), Security, control and privacy concerns related to DEX, Liquidity and Usability of DEX, best DEXs for trading, Fund Management and Trading logic of DEX, Concept of Decentralized Web.

Module 4

Blockchain & Cryptocurrency Regulations: Introduction, History Stance of the Government, Judicial Approach to Cryptocurrency, Possible Reasons for Ban, Virtual Currency Regulations, Global Perspective of Regulations on Blockchain, Future needs for Regulations.

Module 5

Blockchain in Banking Sector: Cross-Border Payments Using Blockchain and Its Benefits, Study of blockchain platforms used for cross-border payments, Impact of Blockchain on Banking Services.

Stable Coin: Concept, Uses and Types of Stable Coins

Case-Study: Tether and Libra Coins

Text Books

1. Melanie Swan, Blockchain: Blueprint for a new economy, Shroff Publisher/O'Reilly Publisher.
2. Ron Quaranta, Blockchain in Financial Markets and Beyond: Challenges and Applications, Risk Books Publisher.

References

1. Richard Hayen, Blockchain & FinTech: A Comprehensive Blueprint to Understanding Blockchain & Financial Technology. - Bitcoin, FinTech, Smart Contracts, Cryptocurrency, Risk Books Publisher.

Corresponding Online Resources:

1. <https://www.accenture.com/in-en/insight-blockchain-technology-how-banksbuilding-real-time>
2. <https://medium.com/search?q=decentralized%20exchange>
3. Emerging Technology Projection: The Total Economic Impact™ Of IBM Blockchain <https://www.ibm.com/downloads/cas/QJ4XA0MD>
4. <https://www.globallegalinsights.com/practice-areas/blockchain-laws-andregulations/india#chaptercontent1>
5. <https://www.eduonix.com/blockchain-and-cryptocurrencies-for-beginners>
6. <https://www.coursera.org/learn/cryptocurrency>

TITLE OF COURSE: BLOCKCHAIN BUSINESS APPLICATION & IMPLICATION

COURSE CODE: BC806

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in block chain.

SunRise University

Introduction:

This course examines different type of business application through block chain. The Topics to be covered (tentatively) include: opportunities for blockchain, blockchain changes the deep structures and architecture of the firm, application of block chain in civil society, private sector, Trust and Vulnerability in block chain.

Course Outcomes (CO):

In this course we will study the block chain in business application. Students are expected to be capable of understanding the implementation of block chain, their advantages and drawbacks, how to implement them in industry, 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 analyse opportunity in blockchain properly.

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

CO3: By analyzing the core idea of efficient business proposal in blockchain.

CO4: To become an efficient blockchain business administrator.

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-1: New Business Models, opportunities for blockchain to disrupt or displace traditional centralized business models. blockchain technology can support “open networked enterprise” business models through the inclusion of native payment systems, reputation systems, uncensorable content, trustless transactions, smart contracts, and autonomous agents.

Module-2: Blockchain and the C-Suite, blockchain changes the deep structures and architecture of the firm, it will consequently transform our models of management and the roles of the C-Suite. Navigating the balance between blockchain’s hype and its true potential is a key responsibility of an organization’s management team, decisions and changes that business leaders can anticipate when considering how the future of blockchain will unfold within their business.

Module-3: Leadership for the Next Era, Blockchain alone is just a tool, fulfill its long-term promise, humans must lead. Rather than relying on state-based institutions, blockchain must be primarily self-governed through collaborations of civil society, private sector, government, and stakeholders in non-state networks, the idea of blockchain governance networks and explain how they can support blockchain stewardship at three levels: The platform level, the application

level, and the ecosystem level. As well, you will learn about the conditions that are necessary for a blockchain-based hub of innovation to succeed.

Module-4: Blueprint for a New Social Contract, digital revolution unfolds, global economy, labor markets, old institutions, and society as a whole. To realize the potential of the blockchain revolution, we need business leaders to come to the table as responsible and active participants in a new social

Module-1: Data blocks are assembled as well as how hash values and encryption are used to ensure the proper sequencing and integrity of data blocks that are added to a blockchain. Round Table Discussion - The Merkle Tree and Immutability

Module-2: Hashing and an Introduction to Cryptocurrencies, hash values and hash sequences. Assembling block header hash values for a specified hash puzzle difficulty level. Blockchain Basics, Round Table Discussion - Proof of Work and Proof of Stake

Module-3: Investigated hash functions and hash puzzles, we will focus on proof-of-work, which is an approach to modifying the blockchain that can be difficult and time-consuming to compute. We will also focus on proof-of-stake, an alternative to updating the blockchain in which larger nodes are modified that already represent a large portion of the blockchain.

Module-4: The pros and cons of each approach and prepare to apply the principles of proof-of-work and proof-of-stake. Comparing proof-of-work and proof-of-stake, alternative approaches that combine the best features of proof-of-work and proof-of-stake.

Text Books

1. Understanding Bitcoin: Cryptography, Engineering and Economics, By Pedro Franco, Wiley.
2. Cryptocurrency Investing For Dummies 1st Edition, by Kiana Danial, ISBN-13: 978-1119533030, ISBN-10: 1119533031

References

1. The Crypto Book: How to Invest Safely in Bitcoin and Other Cryptocurrencies by Siam Kidd

Other Important Subjects in BLOCK CHAIN

TITLE OF COURSE: BLOCKCHAIN BASICS

COURSE CODE:

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in networking.

Introduction:

This course describe basic blockchain technology in networking system. The Topics to be covered (tentatively) include: an introduction to blockchain, Crypto asset or Digital asset, Ethereum Blockchain, Bitcoin & Blockchain, Decentralized Systems and Ethereum Blockchain.

Course Outcomes (CO):

In this course we will study the basic components of blockchain. Students are expected to be capable of understanding the crypto currency, their advantages and drawbacks, how to implement them in blockchain, 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 blockchain properly.

CO2: Students would be able to implement any problem by writing their own algorithm in blockchain. **CO3:** By analyzing, students would be able to implement public private key combination in security. **CO4:** To become an efficient blockchain developer.

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-1: Basic introduction about blockchain in digital world, Crypto asset or Digital asset, Self Sovereign Identity, Smart Contract, Decentralized Business Model, Device to device communication

in blockchain

Module-2: Network Security, Different type of network attack, Warm hole attack, byzantine attack, network based attack etc, Trust based Secure routing schemes.

Module-3: Bitcoin & Blockchain: Blockchain Structure, Basic Operations, Beyond Bitcoin, Gas, minor's role in blockchain.

Module-4: Ethereum Blockchain : Smart Contracts, Ethereum Structure, Ethereum Operations, Incentive Model in blockchain.

Module-5: Cryptography and cryptocurrency: Algorithms & Techniques Public-Key Cryptography, Public key and private key combinations in Blockchain security, Hashing, Transaction Integrity, Securing Blockchain.

Module-6: Decentralized Systems : Consensus Protocol, Practitioner's Perspective Decentralized Governance, Robustness, Forks.

Text Books

1. The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, by Elad Elrom, ISBN-13: 978-1484248461, ISBN-10: 1484248465

References

1. Blockchain Technology Explained: The Ultimate Beginner's Guide about Blockchain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash, IOTA and Smart Contracts, by Alan T. Norman

TITLE OF COURSE: BLOCKCHAIN COMPONENTS & ARCHITECTURE

COURSE CODE:

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in blockchain and networking.

Introduction:

This course described implementation and architecture of blockchain. The Topics to be covered (tentatively) include: an introduction to Blockchain history, Digital Money, Hash, Signature, Blockchains design goals, Blockchain for Government: Digital identity and records.

Course Outcomes (CO):

In this course we will study the basic components of blockchain in digital asset. Students are expected to be capable of understanding the blockchain architecture, their advantages and drawbacks, how to implement them in network, 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 blockchain as a digital asset properly.

CO2: Students would be able to implement different security algorithm in blockchain.

CO3: By analyzing the logic of any algorithm, students would be able to implement Blockchain in Financial Software and Systems.

CO4: To become an efficient blockchain developer.

SunRise University

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-1: Introduction to Blockchain history: Digital Money to Distributed Ledgers Design Primitives: Protocols, Security, Consensus, Permissions, Privacy

Module-2: Blockchain Architecture and Design. Basic crypto primitives: Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms

Module-3: Consensus, Requirements for the consensus protocols, Proof of Work (PoW) Scalability aspects of Blockchain consensus protocols

Module-4: Permissioned Blockchains, Design goals, Consensus protocols for Permissioned Blockchains Hyperledger, Decomposing the consensus process Hyperledger fabric components Chaincode Design and Implementation Hyperledger Fabric beyond Chain code fabric SDK and FrontEnd, Hyperledger composer tool

Module-5: Blockchain in Financial Software and Systems (FSS): Settlements, KYC, Capital markets, Insurance

Use case II: Blockchain in trade supply chain: Provenance of goods, visibility, trade supply chain finance, invoice management discounting, etc

Module-6: Blockchain for Government: Digital identity, and records and other kinds of record keeping between government entities, public distribution system social welfare systems

Module-7: Blockchain Cryptography Privacy and Security on Blockchain, Blockchain consensus protocols, Various recent works on scalability

Module-8: Secure cryptographic protocols on Blockchain Secured, Multi-party Computation, Blockchain, for science: making better use of the data-mining network, Case Studies:

Comparing Ecosystems - Bitcoin, Hyperledger, Ethereum and more

Text Books

1. Blockchain Technology Explained, by Alan T. Norman

References

1. Blockchain: Ultimate guide to understanding blockchain, bitcoin, cryptocurrencies, smart contracts and the future of money.

2. The Bitcoin Standard: The Decentralized Alternative to Central Banking by Saifedean Ammous

TITLE OF COURSE: TRANSACTION ON BLOCKCHAIN
COURSE CODE:

L-T-P: 3-0-2
CREDITS: 4

SunRise University

Pre-requisite: Basic concepts in blockchain technology.

Introduction:

This course examines basic block chain. The Topics to be covered (tentatively) include: an introduction to Cryptoassets, Smart Contracts, Digital Signatures, Financial Services etc.

Course Outcomes (CO):

In this course we will study the basic components of cryptoasset and transaction of blockchain. Students are expected to be capable of understanding the smart contract, their advantages and drawbacks, how to implement them in blockchain, 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 transaction at blockchain properly.

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

CO3: By analyzing the logic of transaction, students would be able to write efficient business proposal in blockchain.

CO4: To become an efficient blockchain developer.

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> |
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| CO1 | ✓ | ✓ | ✓ | | ✓ | | | | | | | ✓ |
| CO2 | ✓ | | | ✓ | | | | | | | | ✓ |
| CO3 | ✓ | ✓ | ✓ | | | | | | | | | ✓ |
| CO4 | ✓ | ✓ | ✓ | | ✓ | | | | | | | ✓ |

Course Contents:

Module-1: Cryptoassets, Cryptocurrencies, Protocol Tokens, Utility Tokens (App Coins), Security Tokens, Natural Asset & Commodity Tokens, Crypto-collectibles, Crypto-fiat Currencies and Stable coins, Practitioner Perspective – Tokenomics, Practitioner Perspective - Cristina Dolan: Cryptoassets, Initial Coin Offerings: A New Breed of Meta-Asset, Practitioner Perspective - Rolf Hoefer: ICOs, Recap of Cryptoassets Protocol Tokens, Utility Tokens (App Coins), Security Tokens, Natural Asset & Commodity Tokens.

Module-2: Smart Contracts, Practitioner Perspective - Rolf Hoefer: Smart Contracts, Smart Contract Phases, Smart vs. Traditional Contracts, Smart Contracts and Law, Practitioner Perspective - Smart Contracts, Smart Contract Application Areas, Practitioner Perspective - Rob Carter: Smart Contracts, Smart Contract Strategies & Best Practices for the Organization, Smart vs. Traditional Contracts, Smart Contract Application Areas

Module-3: Identity, Introduction to Identity and Identifiers, Five Problems With Identifiers,

Blockchain Identity Applications, Practitioner Perspective - Stephen Tse & Li Jiang: Personal Data, Managing Health Data on a Blockchain, Polyalphabetic Ciphers, Symmetric Digital Signatures, RSA, ECC, ECDS

Module-4: Rethinking Finance, Six Inefficiencies in Financial Services, The Golden Eight Part, The

Golden Eight Part, Problems With Modern Accounting, The World Wide Ledger, Rethinking Financial Services, The Golden Eight, New Frameworks for Accounting, The Golden Eight

Text Books

1. A Practical Guide to Blockchain and its applications by Parikshit Jain, Publisher: Bloomsbury India

References

1. Blockchain Enabled Applications: Understand the Blockchain Ecosystem and How to Make it Work for You, by Vikram Dhillon & David Metcalf & Max Hooper

TITLE OF COURSE: BLOCKCHAIN OPPORTUNITY ANALYSIS

COURSE CODE:

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in blockchain.

Introduction:

This course examines Blockchain Transformations for Every Industry. The Topics to be covered (tentatively) include: Industry Transformations, Introduction to the Blockchain Case Commons, Problem Solving with Blockchain, Decision Matrix, Statement of Benefit.

Course Outcomes (CO):

In this course we will study the business are of blockchain. Students are expected to be capable of understanding the implementation blockchain in industry, their advantages and drawbacks, how to implement them in network, 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 analyse opportunity in blockchain properly.

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

CO3: By analyzing the logic of transaction, students would be able to write efficient business proposal in blockchain.

CO4: To become an efficient blockchain administrator.

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> |
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| CO1 | ✓ | ✓ | ✓ | | ✓ | | | | | | | ✓ |
| CO2 | ✓ | | | ✓ | | | | | | | | ✓ |
| CO3 | ✓ | ✓ | ✓ | | | | | | | | | ✓ |
| CO4 | ✓ | ✓ | ✓ | | ✓ | | | | | | | ✓ |

Course Contents:

Module-1: Blockchain Transformations for Every Industry, Practitioner Perspective: Rob Carter, CIO at FedEx, How to Use the Blockchain Case Commons, Decentralizing the Enterprise, Blockchain & ConsenSys, Transaction Costs and the Structure of the Firm, Opportunity Search, Opportunity Contracting, Opportunity Coordination, Opportunity, Building Trust, Determining Corporate Boundaries, Hacking Your Future: Boundary Decisions, Decentralizing the Enterprise, Transaction Costs and the Structure of the Firm

Module-2: Industry Transformations, Introduction to the Blockchain Case Commons, Exploratory Market Research, Conducting Preliminary Market Research, How to Perform a Competitive Analysis, Intellectual Property, Payments, Attribution, and Licensing, Distributed Ownership

Module-3: APAC Business Development & Strategic Relations, Use a Decision Matrix, Problems That Blockchain Can and Cannot Solve, Blockchain Opportunity Brainstorm, Problem Solving WithBlockchain, Decision Matrix, Statement of Benefit,

Module-4: Keyless Technologies, Strategic Positioning of Your Organization, Regulatory Principles, Regulation, Regulation vs. Governance, Regulation & Governance, The Blockchain Stack, Multiple Layers of Blockchain Governance, A New Framework for Blockchain Governance, Practitioner Perspective - Rob Carter: Governance, Profile of a Blockchain Hotbed

Text Books

1. Blockchain: Blueprint for a New Economy Kindle Edition, by Melanie Swan

References

1. The Internet of Money Kindle Edition, by Andreas M. Antonopoulos
2. Bitcoin Billionaires: A True Story of Genius, Betrayal, and Redemption, by Ben Mezrich

TITLE OF COURSE: BITCOIN AND CRYPTO CURRENCY

COURSE CODE:

L-T-P: 3-0-0

CREDITS: 3

Pre-requisite: Basic concepts in blockchain architecture.

Introduction:

This course examines bit coin as a crypto currency. The Topics to be covered (tentatively) include: an introduction to crypto currency, Hash Functions, Hash Pointers, Bitcoin Transactions, Bitcoin Scripts, Applications, payment service in bit coin.

Course Outcomes (CO):

In this course we will study the bit coin as a crypto currency. Students are expected to be capable of understanding the crypto currency, 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 bit coin as a crypto currency properly.

CO2: Students would be able to implement Ethereum under the hood.

CO3: By analyzing the logic of any hash function, students would be able to implement crypto asset.

CO4: To become an efficient blockchain developer.

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-1: Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Cryptocurrency, Transacting in Bitcoin, Why Cryptocurrency.

Module-2: Centralization vs. Decentralization, Distributed Consensus, Consensus without Identity, the Block Chain, Incentives and Proof of Work, Putting It All Together, The Digital Signature, A Tamper Proof Ledger, Examples, Distributed Consensus, Proof of Work, Mining and Currency Supply.

Module-3: Bitcoin Transactions, Bitcoin Scripts, Applications of Bitcoin Scripts, Bitcoin Blocks, The Bitcoin Network, Limitations & Improvements, Cryptocurrency as an Asset Class, Risk and Return to Cryptocurrency, Review of Portfolio Theory, Asset Allocation with Cryptocurrency, Mining, Crypto Classifications, The Crypto Vision, Ethereum Overview, Ethereum Under the Hood, The DAO, Private Blockchains.

Module-4: How to Store and Use Bitcoins, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets, Building the Blockchain, Crypto Finance, Business Use Cases, Blockchain in Gaming, Investing in Blockchain, Government and Regulation, Media and Advocacy, Creating the New Frontier of FinTech.

Text Books

1. Bitcoin and Cryptocurrency Technologies, by Arvind Narayanan, Joseph Bonneau, Edward Felten
2. Understanding Bitcoin: Cryptography, Engineering and Economics, By Pedro Franco, Wiley

References

1. The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, by Elad Elrom, ISBN-13: 978-1484248461, ISBN-10: 1484248465