Syllabus and Scheme

B.Tech. in Information Technology

(For students admitted since 2018)

SEMESTER-I & II

Teaching and Examination Scheme

I Semester: B.Tech
Common to all branches of UG Engineering & Technology

SN	Category	Course Code	Course Title	Hours			Marks			Cr
				L	T	P	IA	ETE	Total	
1	BSC	1FY2-01	Engineering Mathematics-I	3	1	-	40	160	**200**	**4**
2	BSC	1FY2-02/ 1FY2-03	Engineering Physics/ Engineering Chemistry	3	1	-	40	160	**200**	**4**
3	HSMC	1FY1-04/ 1FY1-05	Communication Skills/ Human Values	2	-	-	20	80	**100**	**2**
4	ESC	1FY3-06/ 1FY3-07	Programming for Problem Solving/ Basic Mechanical Engineering	2	-	-	20	80	**100**	**2**
5	ESC	1FY3-08/ 1FY3-09	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	20	80	**100**	**2**
6	BSC	1FY2-20/ 1FY2-21	Engineering Physics Lab/ Engineering Chemistry Lab	-	-	2	30	20	**50**	**1**
7	HSMC	1FY1-22/ 1FY1-23	Language Lab/ Human Values Activities	-	-	2	30	20	**50**	**1**
8	ESC	1FY3-24/ 1FY3-25	Computer Programming Lab/ Manufacturing Practices Workshop	-	-	3	45	30	**75**	**1.5**
9	ESC	1FY3-26/ 1FY3-27	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	**50**	**1**
10	ESC	1FY3-28/ 1FY3-29	Computer Aided Engineering Graphics/ Computer Aided Machine Drawing	-	-	3	45	30	**75**	**1.5**
11	SODECA	1FY8-00							**25**	**0.5**
								Total	**1025**	**20.5**

L = Lecture, **T** = Tutorial,

P = Practical, **IA=**Internal Assessment**,**
ETE=End Term Exam, **Cr**=Credits

Teaching and Examination Scheme

II Semester: B.Tech.
Common to all branches of UG Engineering & Technology

SN	Category	Course Code	Course Title	Hours			Marks			Cr
				L	T	P	IA	ETE	Total	
1	BSC	2FY2-01	Engineering Mathematics-II	3	1	-	40	160	**200**	**4**
2	BSC	2FY2-03/ 2FY2-02	Engineering Chemistry/ Engineering Physics	3	1	-	40	160	**200**	**4**
3	HSMC	2FY1-05/ 2FY1-04	Human Values/ Communication Skills	2	-	-	20	80	**100**	**2**
4	ESC	2FY3-07/ 2FY3-06	Basic Mechanical Engineering/ Programming for Problem Solving	2	-	-	20	80	**100**	**2**
5	ESC	2FY3-09/ 2FY3-08	Basic Civil Engineering/ Basic Electrical Engineering	2	-	-	20	80	**100**	**2**
6	BSC	2FY2-21/ 2FY2-20	Engineering Chemistry Lab/Engineering Physics Lab	-	-	2	30	20	**50**	**1**
7	HSMC	2FY1-23/ 2FY1-22	Human Values Activities/ Language Lab	-	-	2	30	20	**50**	**1**
8	ESC	2FY3-25/ 2FY3-24	Manufacturing Practices Workshop/ Computer Programming Lab	-	-	3	45	30	**75**	**1.5**
9	ESC	2FY3-27/ 2FY3-26	Basic Civil Engineering Lab/Basic Electrical Engineering Lab	-	-	2	30	20	**50**	**1**
10	ESC	2FY3-29/ 2FY3-28	Computer Aided Machine Drawing/ Computer Aided Engineering Graphics	-	-	3	45	30	**75**	**1.5**
11	SODECA	1FY8-00							**25**	**0.5**
								Total	**1025**	**20.5**

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SYLLABUS
I Semester
Common to all branches of UG Engineering & Technology

1FY2-01: Engineering Mathematics-I

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P   **End Term Exam: 3 Hours**

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	**Sequences and Series:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.	6
3	**Fourier Series:** Periodic functions, Fourier series, Euler's formula, Change of intervals, Half range sine and cosine series, Parseval's theorem.	6
4	**Multivariable Calculus (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	**Multivariable Calculus (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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-02/ 2FY2-02: Engineering Physics

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**

3L+1T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**Wave Optics:** 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	**Quantum Mechanics:** 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	**Coherence and Optical Fibers:** 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	**Material Science & Semiconductor Physics:** 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	**Introduction to Electromagnetism:** 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

I & II Semester

Common to all branches of UG Engineering & Technology

1FY2-03/ 2FY2-03: Engineering Chemistry

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P   **End Term Exam: 3 Hours**

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/Dulongs 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

	Emulsification and steam emulsion number.		
5	**Organic reaction mechanism and introduction of drugs:** Organic reaction mechanism: Substitution; SN1, SN2, Elecrophilic 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
	TOTAL		**40**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY1-04/ 2FY1-04: Communication Skills

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

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.	5
2	**Grammar:** Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions)	5
3	**Composition:** Job Application and Curriculum-Vitae Writing. Business Letter Writing. Paragraph Writing. Report Writing.	5
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.	5
5	**Poems:** "No Men are Foreign" by James Kirkup. "If" by Rudyard Kipling. "Where the Mind is without Fear" by Rabindranath Tagore.	5
	TOTAL	**25**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY1-05/ 2FY1-05: Human Values

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**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	5
2	**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.	5
3	**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 (AkhandSamaj), Universal Order (SarvabhaumVyawastha)-from family to world family.	5
4	**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	5

	(Sah-astitva) of mutually interacting units in allpervasive Space. Holistic perception of harmony at all levels of existence	
5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values** 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.	5
	TOTAL	**25**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-06/ 2FY3-06: Programming for Problem Solving

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

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.	8
2	**Number 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.	8
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	**28**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-07/ 2FY3-07: Basic Mechanical Engineering

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**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.	
2	**Pumps and IC Engines:** 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.	
3	**Refrigeration and Air Conditioning:** Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.	
4	**Transmission of Power:** Introduction and types of Belt and Rope Drives, Gears.	
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.	
6	**Engineering Materials and Heat Treatment of Steel:** Introduction to various engineering materials and their properties.	

Common to all branches of UG Engineering & Technology

1FY3-08/ 2FY3-08: Basic Electrical Engineering

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**DC Circuits:** 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.	5
2	**AC Circuits:** 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.	4
3	**Transformers:** Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency.	4
4	**Electrical Machines:** 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.	7
5	**Power Converters:** 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.	4
6	**Electrical Installations:** Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption.	4
	TOTAL	28

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-09/ 2FY3-09: Basic Civil Engineering

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	**Introduction to objective, scope and outcome the subject**	1
2	**Introduction:** Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.	2
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.	3
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.	2
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 Eco-systems.	4
	Water Pollution: Water Quality standards, Introduction to Treatment & Disposal of Waste Water. Reuse and Saving of Water, Rain Water Harvesting.	3
		2

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		**3**
	TOTAL	**28**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-20/ 2FY2-20: Engineering Physics Lab

Credit: 1 **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-21/ 2FY2-21: Engineering Chemistry Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-22/ 2FY2-22: Language Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-23/ 2FY2-23: Human Values Activities

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

Body or with the participation of both or with the participation of both 'I' and Body.
3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:
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.

PS 7:
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.

PS 8:
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 belieds.

PS 9:
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 balues in a difficult situation.

PS 10:
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. Analysis and explain the aspect of mutual fulfillment of each unit with other orders.

PS 11:
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.

PS 12:
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 basic of natural acceptance of human values. If so, how should one proceed in this direction from

the present situation?

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 massage of this course grasped by you. How has this affected you in terms of;
   a. Thought
   b. Behavior
   c. 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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-24/ 2FY3-24: Computer Programming Lab

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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

I & II Semester

Common to all branches of UG Engineering & Technology

1FY3-25/ 2FY3-25: Manufacturing Practices Workshop

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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

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I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-26/ 2FY3-26: Basic Electrical Engineering Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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 winging - 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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-27/ 2FY3-27: Basic Civil Engineering Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-28/ 2FY3-28: Computer Aided Engineering Graphics

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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.

Projections of Point & 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).

Projection of Planes: 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.

Projections of Regular Solids: frustum and truncated solids, those inclined to both the Planes-Auxiliary Views.

Section of Solids: 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)

Overview of Computer Graphics : 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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-29/ 2FY3-29: Computer Aided Machine Drawing

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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.

II Semester
Common to all branches of UG Engineering & Technology

2FY2-01: Engineering Mathematics-II

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P   **End Term Exam: 3 Hours**

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

SEMESTER-III to VIII

Teaching & Examination Scheme
B.Tech. : Information Technology
2nd Year - III Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
all: THEORY											

<table>
<tr><td colspan="12" align="center">THEORY</td></tr>
<tr><td rowspan="2">SN</td><td rowspan="2">Category</td><td colspan="2" align="center">Course</td><td colspan="3" align="center">Contact hrs/week</td><td colspan="4" align="center">Marks</td><td rowspan="2">Cr</td></tr>
<tr><td>Code</td><td>Title</td><td>L</td><td>T</td><td>P</td><td>Exm Hrs</td><td>IA</td><td>ETE</td><td>Total</td></tr>
<tr><td>1</td><td>BSC</td><td>3IT2-01</td><td>Advanced Engineering Mathematics</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>120</td><td>150</td><td>3</td></tr>
<tr><td>2</td><td>HSMC</td><td>3IT1-02/ 3IT1-03</td><td>Technical Communication/ Managerial Economics and Financial Accounting</td><td>2</td><td>0</td><td>0</td><td>2</td><td>20</td><td>80</td><td>100</td><td>2</td></tr>
<tr><td>3</td><td>ESC</td><td>3IT3-04</td><td>Digital Electronics</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>120</td><td>150</td><td>3</td></tr>
<tr><td>4</td><td rowspan="3">PCC</td><td>3IT4-05</td><td>Data Structures and Algorithms</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>120</td><td>150</td><td>3</td></tr>
<tr><td>5</td><td>3IT4-06</td><td>Object Oriented Programming</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>120</td><td>150</td><td>3</td></tr>
<tr><td>6</td><td>3IT4-07</td><td>Software Engineering</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>120</td><td>150</td><td>3</td></tr>
<tr><td colspan="4" align="right">Sub Total</td><td>17</td><td>0</td><td>0</td><td></td><td>170</td><td>680</td><td>850</td><td>17</td></tr>
<tr><td colspan="12"></td></tr>
<tr><td colspan="12" align="center">PRACTICAL & SESSIONAL</td></tr>
<tr><td>8</td><td rowspan="4">PCC</td><td>3IT4-21</td><td>Data Structures and Algorithms Lab</td><td>0</td><td>0</td><td>3</td><td></td><td>45</td><td>30</td><td>75</td><td>1.5</td></tr>
<tr><td>9</td><td>3IT4-22</td><td>Object Oriented Programming Lab</td><td>0</td><td>0</td><td>3</td><td></td><td>45</td><td>30</td><td>75</td><td>1.5</td></tr>
<tr><td>10</td><td>3IT4-23</td><td>Software Engineering Lab</td><td>0</td><td>0</td><td>3</td><td></td><td>45</td><td>30</td><td>75</td><td>1.5</td></tr>
<tr><td>11</td><td>3IT4-24</td><td>Digital Electronics Lab</td><td>0</td><td>0</td><td>3</td><td></td><td>45</td><td>30</td><td>75</td><td>1.5</td></tr>
<tr><td>13</td><td>PSIT</td><td>3IT7-30</td><td>Industrial Training</td><td>0</td><td>0</td><td>1</td><td></td><td>0</td><td>0</td><td>50</td><td>1</td></tr>
<tr><td>14</td><td>SODE CA</td><td>3IT8-00</td><td>Social Outreach, Discipline & Extra Curricular Activities</td><td>0</td><td>0</td><td>0</td><td></td><td>0</td><td>0</td><td>25</td><td>0.5</td></tr>
<tr><td colspan="4" align="right">Sub- Total</td><td>0</td><td>0</td><td>13</td><td></td><td>180</td><td>120</td><td>375</td><td>7.5</td></tr>
<tr><td colspan="4" align="right">TOTAL OF III SEMESTER</td><td>17</td><td>0</td><td>13</td><td></td><td>350</td><td>800</td><td>1225</td><td>24.5</td></tr>
</table>

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Information Technology
2nd Year - IV Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	BSC	4IT2-01	Discrete Mathematics Structure	3	0	0	3	30	120	**150**	**3**
2	HSMC	4IT1-03/ 4IT1-02	Managerial Economics and Financial Accounting / Technical Communication	2	0	0	2	20	80	**100**	**2**
3	ESC	4IT3-04	Principle of Communication	3	0	0	3	30	120	**150**	**3**
4	PCC	4IT4-05	Database Management System	3	0	0	3	30	120	**150**	**3**
5		4IT4-06	Theory of Computation	3	0	0	3	30	120	**150**	**3**
6		4IT4-07	Data Communication and Computer Networks	3	0	0	3	30	120	**150**	**3**
			Sub Total	17	0	0		170	680	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	4IT4-21	Linux Shell Programming Lab	0	0	2		30	20	**50**	**1**
9		4IT4-22	Database Management System Lab	0	0	3		45	30	**75**	**1.5**
10		4IT4-23	Network Programming Lab	0	0	3		45	30	**75**	**1.5**
11		4IT4-24	Java Lab	0	0	2		30	20	**50**	**1**
12		4IT4-25	Web Technology Lab	0	0	2		30	20	**50**	**1**
13	SODE CA	4IT8-00	Social Outreach, Discipline & Extra Curricular Activities							**25**	**0.5**
			Sub- Total	0	0	12		180	120	**325**	**6.5**
			TOTAL OF IV SEMEESTER	17	0	12		350	800	**1175**	**23.5**

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Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Information Technology
3rd Year – V Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	ESC	5IT3-01	Microprocessor And Interfaces	2	0	0	2	20	80	**100**	**2**
2	PCC/ PEC	5IT4-02	Compiler Design	3	0	0	3	30	120	**150**	**3**
3		5IT4-03	Operating System	3	0	0	3	30	120	**150**	**3**
4		5IT4-04	Computer Graphics & Multimedia	3	0	0	3	30	120	**150**	**3**
6		5IT4-05	Analysis of Algorithms	3	0	0	3	30	120	**150**	**3**
7		Professional Elective 1 (any one)		2	0	0	2	20	80	**100**	**2**
		5IT5-11	Wireless Communication								
		5IT5-12	Software Testing and Project Management								
		5IT5-13	Bioinformatics								
			Sub-Total	**16**	**0**	**0**		**160**	**640**	**800**	**16**

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
PRACTICAL & SESSIONAL											
8	PCC	5IT4-21	Computer Graphics & Multimedia Lab	0	0	2	2	30	20	**50**	**1**
9	PCC	5IT4-22	Compiler Design Lab	0	0	2	2	30	20	**50**	**1**
10	PCC	5IT4-23	Analysis of Algorithms Lab	0	0	2	2	30	20	**50**	**1**
11	PCC	5IT4-24	Advanced Java Lab	0	0	2	2	30	20	**50**	**1**
12	PSIT	5IT7-30	Industrial Training	0	0	1		75	50	**125**	**2.5**
13	SODE CA	5IT8-00	Social Outreach, Discipline & Extra Curricular Activities						25	**25**	**0.5**
			Sub- Total	**0**	**0**	**9**		**195**	**155**	**350**	**7**
			TOTAL OF V SEMESTER	**16**	**0**	**9**		**355**	**795**	**1150**	**23**

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Office of Dean Academic Affairs
Rajasthan Technical University, Kota

Teaching & Examination Scheme
B.Tech. : Information Technology
3rd Year – VI Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	ESC	6IT3-01	Digital Image Processing	2	0	0	2	20	80	**100**	**2**
2	PCC /PEC	6IT4-02	Machine Learning	3	0	0	3	30	120	**150**	**3**
3		6IT4-03	Information Security System	2	0	0	2	20	80	**100**	**2**
4		6IT4-04	Computer Architecture and Organization	3	0	0	3	30	120	**150**	**3**
5		6IT4-05	Artificial Intelligence	2	0	0	2	20	80	**100**	**2**
6		6IT4-06	Distributed System	3	0	0	3	30	120	**150**	**3**
7		Professional Elective1 (Any one)		2	0	0	2	20	80	**100**	**2**
		6IT5-11	Information Theory & Coding								
		6IT5-12	Cloud Computing								
		6IT5-13	Ecommerce & ERP								
			Sub Total	**17**	**0**	**0**		**170**	**680**	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	6IT4-21	Digital Image Processing Lab	0	0	3	2	45	30	**75**	**1.5**
9		6IT4-22	Machine Learning Lab	0	0	3	2	45	30	**75**	**1.5**
10		6IT4-23	Python Lab	0	0	3	2	45	30	**75**	**1.5**
11		6IT4-24	Mobile Application Development Lab	0	0	3	2	45	30	**75**	**1.5**
12	SODE CA	6IT8-00	Social Outreach, Discipline & Extra Curricular Activities						25	**25**	**0.5**
			Sub- Total	**0**	**0**	**12**		**180**	**145**	**325**	**6.5**
			TOTAL OF VI SEMESTER	**17**	**0**	**12**		**350**	**825**	**1175**	**23.5**

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Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Scheme & Syllabus

IV Year- VII & VIII Semester: B. Tech. (Information Technology)

Teaching & Examination Scheme
B.Tech.: Information Technology

4th Year – VII Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	PCC	7IT4-01	Big Data Analytics	3	0	0	3	30	120	150	3
2	OE		Open Elective - I	3	0	0	3	30	120	150	3
			Sub-Total	6	0	0	6	60	240	300	6
			PRACTICAL & SESSIONAL								
3	PCC	7IT4-21	Big Data Analytics Lab	0	0	4	2	60	40	**100**	**2**
4	PCC	7IT4-22	Cyber Security Lab	0	0	4	2	60	40	**100**	**2**
5	PSIT	7IT7-30	Industrial Training	1	0	0				**125**	**2.5**
6	PSIT	7IT7-40	Seminar	2	0	0				**100**	**2**
7	SODE CA	7IT8-00	Social Outreach, Discipline & Extra Curricular Activities			1				**25**	**0.5**
			Sub- Total	0	0	10	4	120	80	450	9
			TOTAL OF VII SEMESTER	6	0	10	10	180	320	750	15

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

Teaching & Examination Scheme
B.Tech.: Information Technology
4th Year – VIII Semester

SN	Category	Course Code	Course Title	Contact hrs/week L	T	P	Exm Hrs	IA	ETE	Total	Cr
THEORY											
1	PCC	8IT4-01	Internet of Things	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective - II	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**	**6**	**60**	**240**	**300**	**6**
PRACTICAL & SESSIONAL											
3		8IT4-21	Internet of Things Lab	0	0	2	2	30	20	**50**	**1**
4	PCC	8IT4-22	Software Testing and Validation Lab	0	0	2	2	30	20	**50**	**1**
5	PSIT	8IT7-50	Project	3	0	0				**350**	**7**
6	SODE CA	8IT8-00	Social Outreach, Discipline & Extra Curricular Activities							**25**	**0.5**
			Sub- Total	**0**	**0**	**4**	**4**	**120**	**80**	**475**	**9.5**
			TOTAL OF VIII SEMESTER	**6**	**0**	**4**	**10**	**180**	**320**	**775**	**15.5**

L: *Lecture,* **T:** *Tutorial,* **P:** *Practical,* **Cr:** *Credits*

ETE: *End Term Exam,* **IA:** *Internal Assessment*

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

List of Open Electives for Information Technology

Subject Code	Title	Subject Code	Title
Open Elective - I		**Open Elective - II**	
7AG6-60.1	Human Engineering and Safety	8AG6-60.1	Energy Management
7AG6-60.2	Environmental Engineering and Disaster Management	8AG6-60.2	Waste and By-product Utilization
7AN6-60.1	Aircraft Avionic System	8AN6-60.1	Finite Element Methods
7AN6-60.2	Non-Destructive Testing	8AN6-60.2	Factor of Human Interactions
7CH6-60.1	Optimization Techniques	8CH6-60.1	Refinery Engineering Design
7CH6-60.2	Sustainable Engineering	8CH6-60.2	Fertilizer Technology
7CR6-60.1	Introduction to Ceramic Science & Technology	8CR6-60.1	Electrical and Electronic Ceramics
7CR6-60.2	Plant, Equipment and Furnace Design	8CR6-60.2	Biomaterials
7CE6-60.1	Environmental Impact Analysis	8CE6-60.1	Composite Materials
7CE6-60.2	Disaster Management	8CE6-60.2	Fire and Safety Engineering
7EE6-60.1	Electrical Machines and Drives	8EE6-60.1	Energy Audit and Demand side Management
7EE6-60.2	Power Generation Sources.	8EE6-60.2	Soft Computing
7EC6-60.1	Principle of Electronic communication	8EC6-60.1	Industrial and Biomedical applications of RF Energy
7EC6-60.2	Micro and Smart System Technology	8EC6-60.2	Robotics and control
7ME6-60.1	Finite Element Analysis	8ME6-60.1	Operations Research
7ME6-60.2	Quality Management	8ME6-60.2	Simulation Modeling and Analysis
7MI6-60.1	Rock Engineering	8MI6-60.1	Experimental Stress Analysis
7MI6-60.2	Mineral Processing	8MI6-60.2	Maintenance Management
7PE6-60.1	Pipeline Engineering	8PE6-60.1	Unconventional Hydrocarbon Resources
7PE6-60.2	Water Pollution control Engineering	8PE6-60.2	Energy Management & Policy
7TT6-60.1	Technical Textiles	8TT6-60.1	Material and Human Resource Management
7TT6-60.2	Garment Manufacturing Technology	8TT6-60.2	Disaster Management

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year- III Semester: B.Tech. (Information Technology)

3IT2-01: Advanced Engineering Mathematics

Credit- 3   **Max. Marks : 150 (IA:30,ETE:120)**
3L+0T+0P   **End Term Exam: 03 Hours**

SN	CONTENTS	Hours
1	**Random Variables:** Discrete and Continuous random variables, Joint distribution, Probability distribution function, conditional distribution. Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis.	7
2	**Binomial distribution**, Normal Distribution, Poisson Distribution and their relations, Uniform Distribution, Exponential Distribution. Correlation: Karl Pearson's coefficient, Rank correlation. Curve fitting. Line of Regression.	5
3	**Historical development**, Engineering Applications of Optimization, Formulation of Design Problems as a Mathematical Programming Problems, Classification of Optimization Problems	8
4	**Classical Optimization using Differential Calculus:** Single Variable and Multivariable Optimization with & without Constraints, Langrangian theory, Kuhn Tucker conditions	6
5	**Linear Programming:** Simplex method, Two Phase Method and Duality in Linear Programming. Application of Linear Programming: Transportation and Assignment Problems.	14
	TOTAL	40

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- III Semester: B.Tech. (Information Technology)

3IT1-02/4IT1-02: Technical Communication

Credit- 2   Max. Marks : 100 (IA:20,ETE:80)
2L+0T+0P   End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	**Introduction to Technical Communication-** Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	4
2	**Comprehension of Technical Materials/Texts and Information Design & development-** Reading of technical texts, Readingand comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	6
3	**Technical Writing, Grammar and Editing-** Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	8
4	**Advanced Technical Writing-** Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	8
	TOTAL	**26**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year- III Semester: B.Tech. (Information Technology)

3IT1-03/ 4IT1-03: Managerial Economics and Financial Accounting

Credit- 2   Max. Marks : 100 (IA:20,ETE:80)
2L+0T+0P   End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	**Basic economic concepts-** Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	4
2	**Demand and Supply analysis-** Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
3	**Production and Cost analysis-** Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	5
4	**Market structure and pricing theory-** Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	4
5	**Financial statement analysis-** Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	8
	TOTAL	26

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year- III Semester: B.Tech. (Information Technology)

3IT3-04: Digital Electronics

Credit- 3   Max. Marks : 150 (IA:30,ETE:120)
3L+0T+0P   End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	**Fundamental concepts:** Number systems and codes, Basic logic Gates and Boolean algebra: Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra.Theorems of Boolean algebra.	8
2	**Minimization Techniques and Logic Gates**: Principle of Duality - Boolean expression -Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization.	8
3	**Digital Logic Gate Characteristics:** TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies.MOS& CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET.	8
4	**Combinational Circuits:** Combinational logic circuit design, adder, subtractor, BCD adder, encoder, decoder, BCD to 7-segment decoder, multiplexer, demultiplexer.	8
5	**Sequential Circuits:** Latches, Flip-flops - SR, JK, D, T, and Master-Slave Characteristic table and equation,counters and their design, Synchronous counters – Synchronous Up/Down counters – Programmable counters – State table and state transition diagram ,sequential circuits design methodology. Registers –shift registers.	8
	TOTAL	**40**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS
II Year- III Semester: B.Tech. (Information Technology)

3IT4-05: Data Structures and Algorithms

Credit- 3
3L+0T+0P

Max. Marks : 150 (IA:30,ETE:120)
End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Stacks: Basic Stack Operations, Representation of a Stack using Static Array and Dynamic Array, Multiple stack implementation using single array, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions and Towers of Hanoi.	8
2	Queues: Basic Queue Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues- Round Robin Algorithm. Circular Queues, DeQueue Priority Queues. Linked Lists: Introduction, single linked list, representation of a linked list in memory, Different Operations on a Single linked list, Reversing a single linked list, Advantages and disadvantages of single linked list, circular linked list, double linked list and Header linked list.	10
3	Searching Techniques: Sequential and binary search.Sorting Techniques: Basic concepts, Sorting by: bubble sort, Insertion sort, selection sort, quick sort, heap sort, merge sort, radix sort and counting sorting algorithms.	7
4	Trees: Definition of tree, Properties of tree, Binary Tree, Representation of Binary trees using arrays and linked lists, Operations on a Binary Tree, Binary Tree Traversals (recursive), Binary search tree, B-tree , B+ tree, AVL tree, Threaded binary tree.	7
5	Graphs: Basic concepts, Different representations of Graphs, Graph Traversals (BFS & DFS), Minimum Spanning Tree(Prims &Kruskal), Dijkstra's shortest path algorithms.Hashing: Hash function, Address calculation techniques, Common hashing functions, Collision resolution: Linear and Quadratic probing, Double hashing.	8
	TOTAL	**40**

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3IT4-06: Object Oriented Programming

Credit- 3
3L+0T+0P

Max. Marks : 150 (IA:30,ETE:120)
End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Introduction to different programming paradigm, characteristics of OOP, Class, Object, data member, member function, structures in C++, different access specifiers, defining member function inside and outside class, array of objects.	8
2	Concept of reference, dynamic memory allocation using new and delete operators, inline functions, function overloading, function with default arguments, constructors and destructors, friend function and classes, using this pointer.	8
3	Inheritance, types of inheritance, multiple inheritance, virtual base class, function overriding, abstract class and pure virtual function	9
4	Constant data member and member function, static data member and member function, polymorphism, operator overloading, dynamic binding and virtual function	9
5	Exception handling, Template, Stream class, File handling.	6
	TOTAL	**40**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year- III Semester: B.Tech. (Information Technology)

3IT4-07: Software Engineering

Credit- 3   **Max. Marks : 150 (IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	Introduction, software life-cycle models, software requirements specification, formal requirements specification, verification and validation.	8
2	Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling.	8
3	Requirement Analysis: Requirement analysis tasks, Analysis principles. Software prototyping and specification data dictionary, Finite State Machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioural modeling	8
4	Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation.	8
5	Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling. Object Oriented Design: OOD concepts, Class and object relationships, object modularization, Introduction to Unified ModelingLanguage .	8
	TOTAL	40

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- III Semester: B.Tech. (Information Technology)

3IT4-21: Data Structures and Algorithms Lab

Credit- 1.5   **Max. Marks: 75 (IA:45,ETE:30)**
0L+0T+3P

SN	CONTENTS
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays up to 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structure.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of different sorting algorithm like insertion, quick, heap, bubble and many more sorting algorithms.

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3IT4-22 : Object Oriented Programming Lab

Credit-1.5   **Max. Marks: 75 (IA:45,ETE:30)**
0L+0T+3P

SN	CONTENTS
1	Understand the basics of C++ library, variables, data input-output.
2	C++ program using with the concept of structures.
3	Implement class and object concepts and function overloading.
4	Write programs to understand dynamic memory allocation and array of objects.
5	Program to understand different types of constructors and destructor.
6	Implement friend function to access private data of a class and usage of this pointer.
7	Write programs to understand the usage of constant data member and member function, static data member and member function in a class.
8	Implement different types of inheritance, function overriding and virtual function
9	Implement Operator overloading concepts.
10	Write programs to understand function template and class template.
11	Write programs to understand exception handling techniques.
12	Write programs to understand file handling techniques.

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3IT4-23: Software Engineering Lab

Credit- 1.5   **Max. Marks: 75 (IA:45,ETE:30)**
0L+0T+3P

SN	CONTENTS
1	Development of requirements specification, function oriented design using SA/SD, object-oriented design using UML, test case design, implementation using Java and testing. Use of appropriate CASE tools and other tools such as configuration management tools, program analysis tools in the software life cycle.
2	Develop Software Requirements Specification (SRS) for a given problem in IEEE template.
3	Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project.
4	Develop structured design for the DFD model developed.
5	Developed all Structure UML diagram of the given project.
6	Develop Behavior UML diagram of the given project.
7	Manage file, using ProjectLibre project management software tool.

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3IT4-24: Digital Electronics Lab

Credit- 1.5   **Max. Marks: 75 (IA:45,ETE:30)**
0L+0T+3P

SN	CONTENTS
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gateswith 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized usingNAND& NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor& Full Adder/ Subtractor using NAND & NOR gatesand to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor& basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer.
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9	Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

4IT2-01: Discrete Mathematics Structure

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Set Theory: Definition of sets, countable and uncountable sets, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles) Venn Diagrams, proofs of some general identities on sets. Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction. Composition of Functions. The Pigeonhole and Generalized Pigeonhole Principles.	7
3	Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. 2 way predicate logic. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers.	8
4	Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimodal Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Generating functions, Solution by method of generating functions.	8
5	Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.	8
6	Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs, matching, vertex/edge covering.	8
	Total	40

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4IT1-03/3IT1-03: Managerial Economics and Financial Accounting

Credit- 2   Max. Marks : 100 (IA:20,ETE:80)
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Basic economic concepts-** Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	3
3	**Demand and Supply analysis-** Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
4	**Production and Cost analysis-** Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	5
5	**Market structure and pricing theory-** Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	4
6	**Financial statement analysis-** Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	8
	TOTAL	**26**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- IV Semester: B.Tech. (Information Technology)

4IT1-02/3IT1-02: Technical Communication

Credit- 2   **Max. Marks : 100 (IA:20,ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction to Technical Communication-** Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	3
3	**Comprehension of Technical Materials/Texts and Information Design & development-** Reading of technical texts, Readingand comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	6
4	**Technical Writing, Grammar and Editing-** Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	8
5	**Advanced Technical Writing-** Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	8
	TOTAL	26

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4IT3-04: Principles of Communication

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre- emphasis & de-emphasis, PLL.	7
3	PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)	8
4	PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.	8
5	DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.	8
6	SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.	8
	Total	**40**

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4IT4-05: Database Management System

Credit: 3   Max. Marks: 150(IA:30, ETE:120)
3L+0T+0P   End Term Exam: 3 Hours

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Introduction to database systems: Overview and History of DBMS. File System v/s DBMS. Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS. Entity Relationship model: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, and Design with ER Model- Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.	7
3	Relationship Algebra and Calculus: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus. SQL queries programming and Triggers: The Forms of a Basic SQL Query, Union, and Intersection and Except, Nested Queries, Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.	8
4	Schema refinement and Normal forms: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.	8
5	Transaction Processing: Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules.	8
6	Concurrency Control: Implementation of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling, Database Failure and Recovery: Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.	8
	Total	**40**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- IV Semester: B.Tech. (Information Technology)

4IT4-06: Theory of Computation

Credit: 3
3L+0T+0P

Max. Marks: 150(IA:30, ETE:120)
End Term Exam: 3 Hours

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Finite Automata & Regular Expression: Basic machine, Finite state machine, Transition graph, Transition matrix, Deterministic and non-deterministic finite automation, Equivalence of DFA and NDFA, Decision properties, minimization of finite automata, Mealy & Moore machines. Alphabet, words, Operations, Regular sets, relationship and conversion between Finite automata and regular expression and vice versa, designing regular expressions, closure properties of regular sets, Pumping lemma and regular sets, Myhill- Nerode theorem , Application of pumping lemma, Power of the languages.	7
3	Context Free Grammars (CFG), Derivations and Languages, Relationship between derivation and derivation trees, leftmost and rightmost derivation, sentential forms, parsing and ambiguity, simplification of CFG, normal forms, Greibach and Chomsky Normal form , Problems related to CNF and GNF including membership problem.	8
4	Nondeterministic PDA, Definitions, PDA and CFL, CFG for PDA, Deterministic PDA, and Deterministic PDA and Deterministic CFL , The pumping lemma for CFL's, Closure Properties and Decision properties for CFL, Deciding properties of CFL.	8
5	Turing Machines: Introduction, Definition of Turing Machine, TM language Acceptors and Transducers, Computable Languages and functi Universal TM & Other modification, multiple tracks Turing Machine. Hierarchy of Formal languages: Recursive & recursively enumerable languages, Properties of RL and REL, Introduction of Context sensitive grammers and languages, The Chomsky Hierarchy.	8
6	Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, Un-decidability, examples of these problems like vertex cover problem, Hamiltonian path problem, traveling sales man problem.	8
	Total	**40**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- IV Semester: B.Tech. (Information Technology)

4IT4-07: Data Communication and Computer Networks

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Introductory Concepts: Network hardware, Network software, topologies, Protocols and standards, OSI model, TCP model, TCP/IP model, Physical Layer:Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System.	7
3	Data Link Layer:Error Detection and Correction,Types of Errors, Two dimensional parity check, Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes, Checksum, Standardized Polynomial Code, Error Correction Methods, Forward Error Correction, Protocols: Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA	8
4	Network Layer:Design issues, Routing algorithms: IPV4, IPV6, Address mapping: ARQ, RARQ, Congestion control, Unicast, Multicast, Broadcast routing protocols, Quality of Service, Internetworking.	8
5	Transport Layer: Transport service, Elements of transport protocols, User Datagram Protocol, Transmission Control Protocol, Quality of service, Leaky Bucket and Token Bucket algorithm.	8
6	Application Layer**:** WWW, DNS, Multimedia, Electronic mail, FTP, HTTP, SMTP, Introduction to network security	8
	Total	40

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year- IV Semester: B.Tech. (Information Technology)

4IT4-21: Linux Shell Programming Lab

Credit: 1   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P

List of Experiments:

1. Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script based on control structure- **If-then-if, if-then-else-if, nested if-else to find**
    3.1 Greatest among three numbers.
    3.2 To find a year is leap year or not.
    3.3 To input angles of a triangle and find out whether it is valid triangle or not.
    3.4 To check whether a character is alphabet, digit or special character.
    3.5 To calculate profit or loss.
4. Shell Programming - Looping- while, until, for loops
    4.1 Write a shell script to print all even and odd number from 1 to 10.
    4.2 Write a shell script to print table of a given number
    4.3 Write a shell script to calculate factorial of a given number.
    4.4 Write a shell script to print sum of all even numbers from 1 to 10.
    4.5 Write a shell script to print sum of digit of any number.
5. Shell Programming - case structure, use of break
    5.1 Write a shell script to make a basic calculator which performs addition, subtraction,
        Multiplication, division
    5.2 Write a shell script to print days of a week.
    5.3 Write a shell script to print starting 4 months having 31 days.
6. Shell Programming - Functions
    6.1 Write a shell script to find a number is Armstrong or not.
    6.2 Write a shell script to find a number is palindrome or not.
    6.3 Write a shell script to print Fibonacci series.
    6.4 Write a shell script to find prime number.
    6.5 Write a shell script to convert binary to decimal and decimal to binary
7. Write a shell script to print different shapes- Diamond, triangle, square, rectangle, hollow square etc.

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8.   Shell Programming – Arrays

8.1 Write a C program to read and print elements of array.

8.2 Write a C program to find sum of all array elements.

8.3 Write a C program to find reverse of an array.

8.4 Write a C program to search an element in an array.

8.5 Write a C program to sort array elements in ascending or descending order.

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4IT4-22: Database Management System Lab

Credit: 1.5   **Max. Marks: 75(IA:45, ETE:30)**

0L+0T+3P

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER,UPDATE and DELETE.
4. Write the queries to implement the joins.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG () and COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion , updation and deletion
10.   Using the referential integrity constraints.
11.   Write the query for creating the users and their role.

Data Base Designing Project:

For better understanding students (group of 3-4 students) should design data base for any data base project, understand the requirement and design methodology of project by its own.

Some example of data base design project like:

College management system, Inventory management system and Hospital management system.

4IT4-23: Network Programming Lab

Credit: 1.5   **Max. Marks: 75(IA:45, ETE:30)**
0L+0T+3P

List of Experiments:

1. Study of Different Type of LAN& Network Equipments.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to implement various types of framing methods.
6. Write two programs in C: hello_client and hello_server
   a. The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it closes the connection
   b. The client connects to the server, sends the string "Hello, world!", then closes the connection
7. Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
8. Repeat Exercises 6 & 7 for UDP.
9. Repeat Exercise 7 with multiplexed I/O operations.
10. Simulate Bellman-Ford Routing algorithm in NS2.

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4IT4-24: Java Lab

Credit: 1   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P

List of Experiment:

1. Develop an in depth understanding of programming in Java: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.

2. Write Object Oriented programs in Java: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.

3. Develop understanding to developing packages & Interfaces in Java: Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.

4. Develop understanding to developing Strings and exception handling: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements.
   Usage of throw, throws and finally.

5. Develop applications involving file handling: I/O streams, File I/O.

6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.

Indicative List of exercises:

7. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix

   arithmetic, tower of Hanoi problem etc.

8. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.

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9. Development of a project to demonstrate various file handling concepts.
10. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons. It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives.

4IT4-25: Web Technology Lab

Credit: 1   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P

List of Experiments:

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com. The website should consist of the following pages: Home page, Registration and user Login, User profile page, Books catalog, Shopping cart, Payment By credit card, order confirmation.

2. Validate the registration, user login, user profile and payment by credit card pages using JavaScript.

3. Write an XML file which will display the Book information which includes the following:
   1) Title of the book
   2) Author Name
   3) ISBN number
   4) Publisher name
   5) Edition
   6) Price

   Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows. The contents should be displayed in a table. The header of the table should be in color GREY. And the author name column should be displayed in one color and should be capitalized and bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.

4. 1) Install TOMCAT web server. While installation assign port number 8080. Make sure that these ports are available i.e., no other process is using this port.
   2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in practical 1 and 2 in the document root. Access the pages by using the urls : http://localhost:8080/rama/books.html

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5. User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and, pwd4 respectively. Write a servlet for doing the following.
   1.) Create a Cookie and add these four user ids and passwords to this Cookie.
   2.) Read the user id and passwords entered in the Login form (Practical 1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ".

6. Install a database (MySQL or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Practice 'JDBC' connectivity. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

7. Write a JSP which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

8. Create on ODBC link, Compile & execute JAVA JDBC Socket.

9. Design and implement a simple shopping cart example with session tracking API.

10. Mini Project.

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SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)
5IT3-01: Microprocessor And Interfaces

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to Microprocessor, Components of a Microprocessor:** Registers, ALU and control & timing, System bus (data, address and control bus), Microprocessor systems with bus organization. Microprocessor Architecture and Operations, Memory, I/O devices, Memory and I/O operations.	03
3	**8085 Microprocessor Architecture**: Address, Data And Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation Of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing. Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction And Data Formats, Writing, Assembling & Executing A Program, Debugging The Programs.	07
4	**Assembly language:** Writing 8085 assembly language programs with decision, making and looping using data transfer, arithmetic, logical and branch instructions.	05
5	**Stack & Subroutines:** Developing Counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit Data operations.	07
6	**Interfacing Concepts:** Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A.	05
	Total	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT4-02: Compiler Design

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction:** Objective, scope and outcome of the course. Compiler, Translator, Interpreter definition, Phase of compiler, Bootstrapping, Review of Finite automata lexical analyzer, Input, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.	06
3	**Review of CFG Ambiguity of grammars:** Introduction to parsing. Top down parsing, LL grammars & passers error handling of LL parser, Recursive descent parsing predictive parsers, Bottom up parsing, Shift reduce parsing, LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Operator precedence parsing, Introduction of automatic parser generator: YACC error handling in LR parsers.	10
4	**Syntax directed definitions;** Construction of syntax trees, S-Attributed Definition, L-attributed definitions, Top down translation. Intermediate code forms using postfix notation, DAG, Three address code, TAC for various control structures, Representing TAC using triples and quadruples, Boolean expression and control structures.	10
5	**Storage organization;** Storage allocation, Strategies, Activation records, Accessing local and non-local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.	08
6	**Definition of basic block control flow graphs;** DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.	07
	Total	42

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5IT4-03: Operating System

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction and history of Operating systems:** Structure and operations; processes and files Processor management: inter process communication, mutual exclusion, semaphores, wait and signal procedures, process scheduling and algorithms, critical sections, threads, multithreading	04
3	**Memory management:** contiguous memory allocation, virtual memory, paging, page table structure, demand paging, page replacement policies, thrashing, segmentation, case study	05
4	**Deadlock:** Shared resources, resource allocation and scheduling, resource graph models, deadlock detection, deadlock avoidance, deadlock prevention algorithms **Device management:** devices and their characteristics, device drivers, device handling, disk scheduling algorithms and policies	15
5	**File management:** file concept, types and structures, directory structure, cases studies, access methods and matrices, file security, user authentication	07
6	**UNIX and Linux operating systems as case studies;** Time OS and case studies of Mobile OS	08
	Total	40

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT4-04: Computer Graphics & Multimedia

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Basic of Computer Graphics:** Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards	06
3	**Graphics Primitives:** Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers. Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).	07
4	**Two Dimensional Graphics:** Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping	08
5	**Three Dimensional Graphics:** 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces.3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.	08
6	**Illumination and Colour Models:** Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection.	06
7	**Animations & Realism:** Design of Animation sequences – animation function – raster animation – key frame systems – motion specification – morphing – tweening. COMPUTER **Graphics Realism:** Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.	06
	Total	42

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT4-05: Analysis of Algorithms

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Background**: Review of Algorithm, Complexity Order Notations: definitions and calculating complexity. **Divide And Conquer Method**: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms.	06
3	**Greedy Method**: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees. **Dynamic Programming**: Matrix Chain Multiplication. Longest CommonSubsequence and 0/1 Knapsack Problem.	10
4	**Branch And Bound**: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem. **Pattern Matching Algorithms**: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.	08
5	**Assignment Problems:** Formulation of Assignment and Quadratic Assignment Problem. **Randomized Algorithms-** Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.	08
6	**Problem Classes Np, Np-Hard And Np-Complete:** Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems.Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover andSet Cover Problem.	08
	Total	41

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SYLLABUS

III Year- V Semester: B.Tech. (Information Technology)

5IT5-11: Wireless Communication

Credit: 2
2L+0T+0P

Max. Marks: 100(IA:20, ETE:80)
End Term Exam: 2 Hours

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Wireless Channels:** Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.	06
3	**Cellular Architecture:** Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.	05
4	**Digital Signaling For Fading Channels:** Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.	05
5	**Multipath Mitigation Techniques:** Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,	06
6	**Multiple Antenna Techniques:** MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information- capacity in fading and non-fading channels.	05
	Total	28

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SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT5-12: Software Testing and Project Management

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction, Basic concepts,** Introduction to S/W project management, S/W project management competencies, responsibilities of a software project manager, Software process, S/W process models, project planning, organization of project team, S/W size estimation, estimation of effort & duration,	04
3	**Black box testing:** Boundary value testing, Equivalence class testing, White box testing: statement coverage, Branch coverage, condition coverage, path coverage, McCabe'scyclomatic complexity; Decision Table based testing, Data flow based testing,	05
4	**White box testing:** Integration testing, System testing, Interaction testing, Performance testing, Mutation testing, Regression testing, error seeding ,	05
5	**Object oriented testing:** issues in object oriented testing , Test case design by object oriented software, Fault based testing, test cases and class hierarchy, Scenario based Test design, Testing surface structure and deep structure,	07
6	**Tests case derived from behaviour models**: Test case generation using UML diagrams, GUI testing, object oriented system testing.	06
	Total	28

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SYLLABUS

III Year- V Semester: B.Tech. (Information Technology)

5IT5-13: Bioinformatics

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction:** Basics of biology	02
3	**Sequences:** Problem Statement, Edit distance and substitution matrices, HMMs and pairwise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, Multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs	07
4	**Structures:** Protein structure alignment, Protein structure prediction	06
5	**Phylogenetic trees:** Large parsimony and small parsimony problems, Probabilistic approaches, Grammar-based approaches	07
6	**Miscellaneous topics:** Pathways and networks, Microarrays, Biomedical images	05
	Total	28

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SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT4-21: Computer Graphics & Multimedia Lab

Credit: 1   **Max. Marks:50 (IA:30, ETE:20)**
0L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Implementation of Line, Circle and ellipse attributes
2	To plot a point (pixel) on the screen
3	To draw a straight line using DDA Algorithm
4	Implementation of mid-point circle generating Algorithm
5	Implementation of ellipse generating Algorithm
6	Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear
7	Composite 2D Transformations
8	Cohen Sutherland 2D line clipping and Windowing
9	Sutherland – Hodgeman Polygon clipping Algorithm
10	Three dimensional transformations - Translation, Rotation, Scaling
11	Composite 3D transformations
12	Drawing three dimensional objects and Scenes
13	Generating Fractal images

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SYLLABUS
III Year- V Semester: B.Tech. (Information Technology)

5IT4-22: Compiler Design Lab

Credit: 1   **Max. Marks:50 (IA:30, ETE:20)**
0L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Introduction: Objective, scope and outcome of the course.
2	To identify whether given string is keyword or not.
3	Count total no. of keywords in a file. [Taking file from user]
4	Count total no of operators in a file. [Taking file from user]
5	Count total occurrence of each character in a given file. [Taking file from user]
6	Write a C program to insert, delete and display the entries in Symbol Table.
7	Write a LEX program to identify following: 1. Valid mobile number 2. Valid url 3. Valid identifier 4. Valid date (dd/mm/yyyy) 5. Valid time (hh:mm:ss)
8	Write a lex program to count blank spaces,words,lines in a given file.
9	Write a lex program to count the no. of vowels and consonants in a C file.
10	Write a YACC program to recognize strings aaab,abbb using a^nb^n, where b>=0.
11	Write a YACC program to evaluate an arithmetic expression involving operators +,-,* and /.
12	Write a YACC program to check validity of a strings abcd,aabbcd using grammar a^nb^nc^md^m, where n , m>0
13	Write a C program to find first of any grammar.

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5IT4-23: Analysis of Algorithms Lab

Credit: 1	Max. Marks:50 (IA:30, ETE:20)
0L+0T+2P	End Term Exam: 2 Hours

SN	List of Experiments
1	Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2	Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3	a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4	Implement 0/1 Knapsack problem using Dynamic Programming.
5	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7	a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
8.	Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
9.	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
10	Implement N Queen's problem using Back Tracking.

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5IT4-24: Advanced Java Lab

Credit: 1   **Max. Marks:50 (IA:30, ETE:20)**
L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Introduction To Swing, MVC Architecture, Applets, Applications and Pluggable Look and Feel, Basic swing components : Text Fields, Buttons, Toggle Buttons, Checkboxes, and Radio Buttons
2	Java database Programming, java.sql Package, JDBC driver, Network Programming With java.net Package, Client and Server Programs, Content And Protocol Handlers
3	RMI architecture, RMI registry, Writing distributed application with RMI, Naming services, Naming And Directory Services, Overview of JNDI, Object serialization and Internationalization
4	J2EE architecture, Enterprise application concepts, n-tier application concepts, J2EE platform, HTTP protocol, web application, Web containers and Application servers
5	Server side programming with Java Servlet, HTTP and Servlet, Servlet API, life cycle, configuration and context, Request and Response objects, Session handling and event handling, Introduction to filters with writing simple filter application
6	JSP architecture, JSP page life cycle, JSP elements, Expression Language, Tag Extensions, Tag Extension API, Tag handlers, JSP Fragments, Tag Files, JSTL, Core Tag library, overview of XML Tag library, SQL Tag library and Functions Tag library

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- VI Semester: B.Tech. (Information Technology)

6IT3-01: Digital Image Processing

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to Image Processing:** Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.	04
3	**Image Transformation & Filtering:** Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms.	06
4	**Image Restoration:** Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering.	07
5	**Image Compression:** Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.	05
6	**Image Segmentation & Representation:** Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors.	05
	Total	28

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SYLLABUS

III Year- VI Semester: B.Tech. (Information Technology)

6IT4-02:Machine Learning

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Supervised learning algorithm:** Introduction, types of learning, application, Supervised learning: Linear Regression Model, Naive Bayes classifier Decision Tree, K nearest neighbor, Logistic Regression, Support Vector Machine, Random forest algorithm	09
3	**Unsupervised learning algorithm:** Grouping unlabelled items using k-means clustering, Hierarchical Clustering, Probabilistic clustering, Association rule mining, Apriori Algorithm, f-p growth algorithm, Gaussian mixture model.	08
4	**Introduction to Statistical Learning Theory**, Feature extraction - Principal component analysis, Singular value decomposition. Feature selection – feature ranking and subset selection, filter, wrapper and embedded methods, Evaluating Machine Learning algorithms and Model Selection.	08
5	**Semi supervised learning, Reinforcement learning:** Markov decision process (MDP), Bellman equations, policy evaluation using Monte Carlo, Policy iteration and Value iteration, Q-Learning, State-Action-Reward-State-Action (SARSA), Model-based Reinforcement Learning.	08
6	**Recommended system,** Collaborative filtering, Content-based filtering Artificial neural network, Perceptron, Multilayer network, Backpropagation, Introduction to Deep learning.	08
	Total	42

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- VI Semester: B.Tech. (Information Technology)

6IT4-03: Information Security System

Credit:2   **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to security attacks:** services and mechanism, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers.	06
3	**Modern block ciphers**: Block Cipher structure, Data Encryption standard (DES) with example, strength of DES, Design principles of block cipher, AES with structure, its transformation functions, key expansion, example and implementation. Multiple encryption and triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode.	06
4	**Public Key Cryptosystems with Applications:** Requirements and Cryptanalysis, RSA cryptosystem, Rabin cryptosystem, Elgamal cryptosystem, Elliptic curve cryptosystem.	06
5	**Cryptographic Hash Functions, their applications:** Simple hash functions, its requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA). Message Authentication Codes, its requirements and security, MACs based on Hash Functions, Macs based on Block Ciphers.Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm.	05
6	**Key management and distribution:** symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys, X.509 certificates, Public key infrastructure. Remote user authentication with symmetric and asymmetric encryption, Kerberos Web Security threats and approaches, SSL architecture and protocol, Transport layer security, HTTPS and SSH.	04
	Total	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- VI Semester: B.Tech. (Information Technology)

6IT4-04: Computer Architecture and Organization

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Computer Data Representation:** Basic computer data types, Complements, Fixed point representation, Register Transfer and Micro-operations: Floating point representation, Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers, Memory Transfer), Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit. Basic Computer Organization and Design Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit.	10
3	**Programming The Basic Computer:** Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, subroutines, I-O Programming. Micro programmed Control:Control Memory, Address sequencing, Micro program Example,design of control Unit	7
4	**Central Processing Unit:**Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation,Program Control, Reduced Instruction Set Computer (RISC)Pipeline And Vector Processing, Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors	8
5	**Computer Arithmetic:** Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit.Input-Output Organization, Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPUIOP Communication, Serial communication.	8
6	**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Multipreocessors: Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication andSynchronization, Cache Coherence, Shared Memory Multiprocessors.	8
	Total	**42**

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6IT4-05: Artificial Intelligence

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to AI and Intelligent agent:** Different Approach of AI, Problem Solving : Solving Problems by Searching, Uninformed search, BFS, DFS, Iterative deepening, Bi directional search, Hill climbing, Informed search techniques: heuristic, Greedy search, A* search, AO* search, constraint satisfaction problems.	01
3	**Game Playing:** Minimax, alpha-beta pruning, jug problem, chess problem, tiles problem	07
4	**Knowledge and Reasoning:** Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.	07
5	**Learning:** Overview of different forms of learning, Supervised base learning: Learning Decision Trees, SVM, Unsupervised based learning, Market Basket Analysis, Neural Networks.	07
6	**Introduction to Natural Language Processing:** Different issue involved in NLP, Expert System, Robotics.	05
	Total	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
III Year- VI Semester: B.Tech. (Information Technology)

6IT4-06: Distributed System

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Distributed Systems:** Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE). Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.	09
3	**Concurrent Processes and Programming:** Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).Inter-process Communication and Coordination: Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies	08
4	**Distributed Process Scheduling:** A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation. Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication. Case studies: Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems	08
5	**Distributed Shared Memory:** Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems. Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots, Modelling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection.	08
6	**Distributed Agreement:** Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement. Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation. CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services.	08
	Total	**42**

6IT5-11: Information Theory & Coding

Credit: 2   **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to information theory:** Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.	04
3	**Source coding schemes for data compaction:** Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.	05
4	**Linear Block Code:** Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration, conversion of non-systematic form of matrices into systematic form.	06
5	**Cyclic Code:** Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.	06
6	**Convolutional Code:** Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.	06
	Total	28

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6IT5-12: Cloud Computing

Credit: 2   Max. Marks: 100(IA:20, ETE:80)
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction:** Objective, scope and outcome of the course. Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things	03
3	**Cloud Computing Architecture:** Cloud Reference Model, Layer and Types of Clouds, Services models, Data centre Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-Map Reduce, Hadoop, High level Language for Cloud. Programming of Google App engine.	05
4	**Virtualization Technology:** Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-centre.	07
5	**Securing the Cloud:** Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing. Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management	07
6	**Cloud Platforms in Industry:** Amazon web services , Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM	05
	Total	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS
III Year- VI Semester: B.Tech. (Information Technology)

6IT5-13: Ecommerce & ERP

Credit: 2
2L+0T+0P

Max. Marks: 100(IA:20, ETE:80)
End Term Exam: 2 Hours

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to E-Commerce:** Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities; Process of E-Commerce; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.	03
3	**E-Commerce Activities:** Various Activities of E-Commerce; Various Modes of Operation Associated with E-Commerce; Matrix of E-Commerce Types; Elements and Resources Impacting E-Commerce and Changes; Types of E-Commerce Providers and Vendors; Man Power Associated with E-Commerce Activities; Opportunity Development for E-Commerce Stages; Development of E-Commerce Business Case; Components and Factors for the Development of the Business Case; Steps to Design and Develop an E-Commerce Website.	05
4	**Internet – The Backbone for E-Commerce:** Early Ages of Internet; Networking Categories; Characteristics of Internet; Components of Internet – Internet Services, Elements of Internet, Uniform Resource Locators, Internet Protocol; Shopping Cart, Cookies and E-Commerce; Web Site Communication; Strategic Capabilities of Internet.	07
5	**ISP, WWW and Portals:** Internet Service Provider (ISP); World Wide Web (WWW); Portals – Steps to build homepage, Metadata; Advantages of Portal; Enterprise Information Portal (EIP). **E-Commerce & Online Publishing:** This unit explains the concept of online publishing, strategies and approaches of online publishing, and online advertising.	07
6	**XML and Data Warehousing:** Definition of eXtensible Markup Language (XML); XML Development Goals; Comparison between HTML and XML; Business importance in using XML Based Technology; Advantages, Disadvantages and Applications of XML; Structure of an XML Document; XHTML and X/Secure; Data Warehousing; Data Marts and Operational Data Stores. **E-Marketing:** Traditional Marketing; E-Marketing; Identifying Web Presence Goals – Achieving web presence goals, Uniqueness of the web, Meeting the needs of website visitors, Site Adhesion: Content, format and access; Maintaining a Website; Metrics Defining Internet Units of Measurement; Online Marketing; Advantages of Online Marketing.	05
		28

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6IT4-21: Digital Image Processing Lab

Credit: 1.5   **Max. Marks: 75(IA:45, ETE:30)**

0L+0T+3P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Point-to-point transformation. This laboratory experiment provides for thresholding an image and the evaluation of its histogram. Histogram equalization. This experiment illustrates the relationship among the intensities (gray levels) of an image and its histogram.
2	Geometric transformations. This experiment shows image rotation, scaling, and translation. Two-dimensional Fourier transform
3	Linear filtering using convolution. Highly selective filters.
4	Ideal filters in the frequency domain. Non Linear filtering using convolutional masks. Edge detection. This experiment enables students to understand the concept of edge detectors and their operation in noisy images.
5	Morphological operations: This experiment is intended so students can appreciate the effect of morphological operations using a small structuring element on simple binary images. The operations that can be performed are erosion, dilation, opening, closing, open-close, close-open.

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6IT4-22: Machine Learning Lab

Credit: 1.5   **Max. Marks: 75(IA:45, ETE:30)**
0L+0T+3P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.
3	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample
4	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
5	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6	Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7	Write a program to construct aBayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10	Implement the non-parametric Locally Weighted Regressionalgorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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6IT4-23: Python Lab

Credit: 1.5	Max. Marks: 75(IA:45, ETE:30)
0L+0T+3P	End Term Exam: 2 Hours

SN	List of Experiments
1	Write a program to demonstrate basic data type in python.
2	Write a program to compute distance between two points taking input from the user Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
3	Write a Program for checking whether the given number is an even number or not. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
4	Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
5	Find the sum of all the primes below two million. By considering the terms in the Fibonacci sequence whose values do not exceed four million, WAP to find the sum of the even-valued terms.
6	Write a program to count the numbers of characters in the string and store them in a dictionary data structure Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure
7	Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file? Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
8	Write a program to print each line of a file in reverse order. Write a program to compute the number of characters, words and lines in a file.
9	Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on. Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.
10	Write a program to implement Merge sort. Write a program to implement Selection sort, Insertion sort.

6IT4-24: Mobile Application Development Lab

Credit: 1.5
0L+0T+3P

Max. Marks: 75(IA:45, ETE:30)
End Term Exam: 2 Hours

SN	List of Experiments
1	To study Android Studio and android studio installation. Create "Hello World" application.
2	To understand Activity, Intent, Create sample application with login module.(Check username and password).
3	Design simple GUI application with activity and intents e.g. calculator.
4	Develop an application that makes use of RSS Feed.
5	Write an application that draws basic graphical primitives on the screen
6	Create an android app for database creation using SQLite Database.
7	Develop a native application that uses GPS location information
8	Implement an application that writes data to the SD card.
9	Design a gaming application
10	Create an application to handle images and videos according to size.

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7IT4-01: Big Data Analytics

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to Big Data:** Big data features and challenges, Problems with Traditional Large-Scale System , Sources of Big Data, 3 V's of Big Data, Types of Data. Working with Big Data: Google File System. Hadoop Distributed File System (HDFS) - Building blocks of Hadoop (Namenode. Data node. Secondary Namenode. Job Tracker. Task Tracker), Introducing and Configuring Hadoop cluster (Local. Pseudo-distributed mode, Fully Distributed mode). Configuring XML files.	10
3	**Writing Map Reduce Programs:** A Weather Dataset. Understanding Hadoop API for MapReduce Framework (Old and New). Basic programs of Hadoop MapReduce: Driver code. Mapper code, Reducer code. Record Reader, Combiner,Partitioner.	08
4	**Hadoop I/O:** The Writable Interface. Writable Comparable and comparators. Writable Classes: Writable wrappers for Java primitives. Text. Bytes Writable. Null Writable, Object Writable and Generic Writable. Writable collections. Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.	08
5	**Pig:** Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow. Working through the ABCs of Pig Latin. Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.	07
6	**Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive. Examining the Hive Clients. Working with Hive Data Types. Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.	06
	Total	40

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Scheme & Syllabus
IV Year- VII & VIII Semester: B. Tech. (Information Technology)

7IT4-21: Big Data Analytics Lab

Credit: 2   **Max. Marks: 100(IA:60, ETE:40)**
0L+0T+4P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Implement the following Data structures in Java i) Linked Lists ii) Stacks iii) Queues iv) Set v) Map
2	Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudodistributed, Fully distributed.
3	Implement the following file management tasks in Hadoop: • Adding files and directories • Retrieving files • Deleting files Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
4	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5	Write a Map Reduce program that mines weather data. Weather sensors collecting data everyhour at many locations across the globe gather a large volume of log data, which is a goodcandidate for analysis with MapReduce, since it is semi structured and record-oriented.
6	Implement Matrix Multiplication with Hadoop Map Reduce
7	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
8	Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
9	Solve some real life big data problems.

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7IT4-22: Security Lab

Credit: 2   **Max. Marks: 100(IA:60, ETE:40)**
0L+0T+4P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipherb) Rail fence row & Column Transformation
2	Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
3	Implement the following Attack: a) Dictionary Attack b) Brute Force Attack
4	Installation of Wire shark, tcpdump, etc and observe data transferred in client server communication using UDP/TCP and identify the UDP/TCP datagram.
5	Installation of rootkits and study about the variety of options.
6	Perform an Experiment to Sniff Traffic using ARP Poisoning.
7	Demonstrate intrusion detection system using any tool (snort or any other s/w).
8	Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures.
	PROJECT: In a small area location such as a house, office or in a classroom, there is a small network called a Local Area Network (LAN). The project aims to transfer a file peer-to-peer from one computer to another computer in the same LAN. It provides the necessary authentication for file transferring in the network transmission. By implementing the Server-Client technology, use a File Transfer Protocol mechanism and through socket programming, the end user is able to send and receive the encrypted and decrypted file in the LAN. An additional aim of the project is to transfer a file between computers securely in LANs. Elements of security are needed in the project because securing the files is an important task, which ensures files are not captured or altered by anyone on the same network. Whenever you transmit files over a network, there is a good chance your data will be encrypted by encryption technique. Any algorithm like AES is used to encrypt the file that needs to transfer to another computer. The encrypted file is then sent to a receiver computer and will need to be decrypted before the user can open the file.

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Scheme & Syllabus

IV Year- VII & VIII Semester: B. Tech. (Information Technology)

8IT4-01: Internet of Things

Credit: 3   **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Introduction to IoT:** Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT- Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates.	08
3	**IoT Hardware and Software:** Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.	07
4	**Architecture and Reference Model:** Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs). Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges.	08
5	**IOT and M2M:** M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT.	08
6	**Case study of IoT Applications:** Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.	08
	Total	40

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8IT4-21: Internet of Things Lab

Credit: 1   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	Start Raspberry Pi and try various Linix commands in command terminal window: *ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.*
2	Run some python programs on Pi like: a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division. c) Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.
3	Run some python programs on Pi like: a) Print a name 'n' times, where name and n are read from standard input, using for and while loops. b) Handle Divided by Zero Exception. c) Print current time for 10 times with an interval of 10 seconds. d) Read a file line by line and print the word count of each line.
4	a) Light an LED through Python program b) Get input from two switches and switch on corresponding LEDs c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
5	a) Flash an LED based on cron output (acts as an alarm) b) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load. c) Get the status of a bulb at a remote place (on the LAN) through web.
	The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

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8IT4-22: Software Testing and Validation Lab

Credit: 1   **Max. Marks:50 (IA:30, ETE:20)**
L+0T+2P   **End Term Exam: 2 Hours**

SN	List of Experiments
1	a) Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program using JaButi Tool. b) Write a program which read the first name and last name from console and matching with expected result by using JaBuTi. c) Write a program that takes three double numbers from the java console representing , respectively, the three coefficients a,b, and c of a quadratic equation. d) Write a program that reads commercial website URL from a url from file .you should expect that the URL starts with www and ends with .com. retrieve the name of the site and output it. For instance, if the user inputs www.yahoo.com, you should output yahoo. After that find the test cases and coverage using JaButi. e) Write a program for a calculator and find the test case and coverage and Def-use-graph. f) Write a program that reads two words representing passwords from the java console and outputs the number of character in the smaller of the two. For example, if the words are open and sesame, then the output should be 4, the length of the shorter word, open. And test this program using JaButi
2	Analyse the performance of following website using JMeter. <table><tr><td>Site</td><td>Website</td><td>Type</td></tr><tr><td>Amazon</td><td>Amazon.com</td><td>shopping</td></tr><tr><td>Flip kart</td><td>Flipkart.com</td><td>shopping</td></tr><tr><td>Railway reservation</td><td>Irctc.co.in</td><td>Ticket booking site</td></tr><tr><td>Train searching</td><td>Erail.in</td><td>Train searching</td></tr></table>
3	Calculate the mutation score of programs given in 1(a) to 1 (f) using jumble Tool.
4	Calculate the coverage analysis of programs given in 1 (a) to 1 (f) using Eclemma Free open source Tool.

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5	Generate Test sequences and validate using Selenium tool for given websites below:		

Site	Website	Type
Amazon	Amazon.com	shopping
Flip kart	Flipkart.com	shopping
Railway reservation	Irctc.co.in	Ticket booking site
Train searching	Erail.in	Train searching