Integrated M.Tech Programmes in Converging Technology

- **Nanoscience and Nanotechnology (INN)**
- **Bioinformatics and Biotechnology (IBB)**
- **Information and Communication Technology (IIT)**
- **Cognitive and Neurosciences (ICN)**
- **Environmental Science and Technology (IET)**

Programme Code: ICT

Duration – 5 Years

Programme Structure
And
Curriculum & Scheme of Examination
With
Choice Based Credit System (CBCS)
2015,16,17&18 Batch

AMITY UNIVERSITY
R A J A S T H A N

Credit Summary Sheet

Integrated M.Tech Converging Technology					
Semester	CC	DE	VA	OE	Total
1	20	3	4	-	27
2	24	-	4	-	28
3	24	-	4	-	28
4	20	-	4	-	27
5	20	-	4	3	27
6	20	-	4	3	27
7	19	3	4	-	26
8	19	3	4	-	26
9&10	40		-		40
Total	206	09	32	6	253

Program Structure

Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
Integrated M.Tech Converging Technology : I- SEMESTER						
ICT101	Properties of Matter, Thermal Physics and Optics	CC	3	1	-	4
ICT102	Fundamentals Inorganic & Organic Chemistry	CC	3	1	-	4
ICT103	Biochemistry & Molecular Biology	CC	3	1	-	4
ICT104	Programming language fundamental & Programming in C	CC	3	1	-	4
ICT121	Properties of Matter, Thermal Physics and Optics-Lab	CC	-	-	2	1
ICT122	Fundamentals Inorganic & Organic Chemistry-Lab	CC	-	-	2	1
ICT123	Biochemistry & Molecular Biology-Lab	CC	-	-	2	1
ICT124	Programming language fundamental & Programming in C-Lab	CC	-	-	2	1
DE Electives: DE for 10+2 PCB is ICT105 & for PCM is ICT106						
ICT105	Foundation Course in Mathematics	DE	3	-	-	3
ICT106	Foundation Course in Biology	DE				
BCS 101	English	VA	1	-	-	1
BSS105	Understanding Self for Effectiveness – I	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language - I French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

Integrated M.Tech Converging Technology : II- SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICT201	Semiconductor, Electronic devices & Applications	CC	3	-	-	3
ICT202	Physical Chemistry	CC	3	-	-	3
ICT203	Cell Biology & Genetics	CC	3	1	-	4
ICT204	Object Oriented Programming in C++	CC	3	-	-	3
ICT205	Calculus	CC	3	-	-	3
ICT221	Semiconductor, Electronic devices & Applications-Lab	CC	-	-	2	1
ICT222	Physical Chemistry-Lab	CC	-	-	2	1
ICT223	Cell Biology & Genetics-Lab	CC	-	-	2	1
ICT224	Object Oriented Programming in C++-Lab	CC	-	-	2	1
EVS001	Environmental Sciences	CC	4	-	-	4
BCS 201	English	VA	1	-	-	1
BSS205	Understanding Self for Effectiveness – II	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language - II French German Spanish Chinese	VA	2	-	-	2
	TOTAL					28

Integrated M.Tech Converging Technology : III- SEMESTER						
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
ICT301	Electrodynamics and Quantum Mechanics	CC	3	-	-	3
ICT302	Atomic, Molecular and Nuclear Spectroscopy	CC	3	-	-	3
ICT303	Developmental Biology	CC	3	1	-	4
ICT304	Programming in JAVA	CC	3	1	-	4
ICT305	Differential Equations	CC	3	-	-	3
ICT 306	Instrumentation in Biology	CC	3			3
ICT321	Atomic, Molecular and Nuclear Spectroscopy Lab	CC	-	-	2	1
ICT322	Developmental Biology Lab	CC	-	-	2	1
ICT323	Programming in JAVA Lab	CC	-	-	2	1
ICT324	Instrumentation in Biology Lab	CC	-	-	2	1
BCS301	Communication Skills-I	VA	1	-	-	1
BSS305	Understanding Self for Effectiveness – III	VA	1	-	-	1
FLT301 FLG301 FLS301 FLC301	Foreign Language - III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**28**

Integrated M.Tech Converging Technology : IV- SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICT401	Statistical and Solid state Physics	CC	3	-	-	3
ICT402	Quantum Chemistry	CC	3	-	-	3
ICT403	Fundamentals of Bioinformatics	CC	3	-	-	3
ICT404	Database management System	CC	3	-	-	3
ICT405	Statistical methods	CC	3	-	-	3
ICT 406	Workshop Practice	CC	-	-	2	1
ICT 407	Microbiology		3	-	-	3
ICT421	Fundamentals of Bioinformatics Lab	CC	-	-	2	1
ICT422	Database management System Lab	CC	-	-	2	1
ICT423	Microbiology Lab	CC		-	4	2
BCS401	Communication Skills-II	VA	1	-	-	1
BSS405	Understanding Self for Effectiveness – IV	VA	1	-	-	1
FLT401 FLG401 FLS401 FLC401	Foreign Language - IV French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

Integrated M.Tech Converging Technology : V- SEMESTER							
Course Code	**Course Title**	**Category**	**Lectures (L) Hours Per Week**	**Tutorial (T) Hours Per Week**	**Practical (P) Hours Per Week**	**Credits**
ICT501	Advanced Genetic Engineering	CC	3	-		3
ICT502	Fundamentals of Nanoscience and Nanotechnology	CC	3	-		3
ICT503	Fundamentals of Information and communication technology	CC	3	-		3
ICT504	Fundamentals of Cognitive and Neuroscience	CC	3	-		3
ICT 505	Fundamentals of Environment Science and Technology	CC	3	-		3
OE	Open Elective	OE	3	-	-	3
ICT521	Advanced Genetic Engineering Lab	CC	-	-	2	1
ICT522	Fundamentals of Nanoscience and Nanotechnology Lab	CC	-	-	2	1
ICT523	Fundamentals of Information and communication technology Lab	CC	-	-	2	1
ICT524	Fundamentals of Cognitive and Neuroscience Lab	CC	-	-	2	1
ICT525	Fundamentals of Environment Science and Technology Lab	CC	-	-	2	1
BCS501	Communication Skills-III	VA	1	-	-	1
BSS505	Understanding Self for Effectiveness – V	VA	1	-	-	1
FLT501 FLG501 FLS501 FLC501	Foreign Language - V French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

Integrated M.Tech Converging Technology : VI- SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICT601	Nanotechnology in biology and medicine	CC	3	-	-	3
ICT602	Functional and Comparative Genomics	CC	3	-	-	3
ICT603	Artificial Intelligence	CC	3	-	-	3
ICT604	Cognitive Neurology	CC	3	-	-	3
ICT 605	Environmental Systems Modeling	CC	3	-	-	3
OE	Open elective	OE	3	-	-	3
ICT621	Nanotechnology in biology and medicine Lab	CC	-	-	2	1
ICT622	Functional and Comparative Genomics Lab	CC	-	-	2	1
ICT623	Artificial Intelligence Lab	CC	-	-	2	1
ICT624	Cognitive Neurology Lab	CC	-	-	2	1
ICT 625	Environmental Systems Modeling Lab	CC	-	-	2	1
BCS601	Communication Skills-IV	VA	1	-	-	1
BSS605	Understanding Self for Effectiveness –VI	VA	1	-	-	1
FLT601 FLG601 FLS601 FLC601	Foreign Language - VI French German Spanish Chinese	VA	2	-	-	2
	TOTAL					27

Integrated M.Tech Converging Technology : IBB (VII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
IBB701	Advanced Computational Biology	CC	3	-	-	3
IBB702	R & Bioconductor	CC	3	-	-	3
IBB703	Bioprocess Engineering and technology	CC	3	-	-	3
IBB704	Immunotechnology	CC	3	-	-	3
IBB 705	Research Methodology	CC	3	-	-	3
IBB721	Advanced Computational Biology Lab	CC	-	-	2	1
IBB722	R & Bioconductor Lab	CC	-	-	2	1
IBB723	Bioprocess Engineering and technology	CC	-	-	2	1
IBB 724	Immunotechnology Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
IBB730	Nanomaterial Design and applications	DE	3	-		3
IBB731	Modern operating systems	DE	3	-		3
IBB732	Psychology of mind	DE	3	-		3
IBB733	Energy Safety and hazard control	DE	3	-		3
BCS701	Communication Skills-V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT701 FLG701 FLS701 FLC701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**26**

Integrated M.Tech Converging Technology : INN (VII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
INN701	Nanodevices and Nanosensors	CC	3	-	-	3
INN702	Nanophotonics	CC	3	-	-	3
INN703	Nanomaterial Design and applications	CC	3	-	-	3
INN 704	Nanoelectronics	CC	3	-	-	3
INN 705	Research Methodology	CC	3	-	-	3
INN 721	Nanodevices and Nanosensors Lab	CC	-	-	2	1
INN722	Nanophotonics Lab	CC	-	-	2	1
INN723	Nanomaterial Design and applications Lab	CC	-	-	2	1
INN 724	Nanoelectronics Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
INN730	Immunotechnology	DE	3	-	-	3
INN731	Modern operating systems	DE	3	-	-	3
INN732	Psychology of mind	DE	3	-	-	3
INN733	Energy Safety and hazard control	DE	3	-	-	3
BCS701	Communication Skills-V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT701 FLG701 FLS701 FLC701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**26**

Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
Integrated M.Tech Converging Technology : IIT (VII – SEMESTER)						
IIT701	Satellite Communication	CC	3	-	-	3
IIT702	Optical Fiber Communication	CC	3	-	-	3
IIT703	Modern operating systems	CC	3	-	-	3
IIT 704	Signal and Image Processing	CC	3	-	-	3
IIT 705	Research Methodology	CC	3	-	-	3
IIT 721	Satellite Communication Lab	CC	-	-	2	1
IIT722	Optical Fiber Communication Lab	CC	-	-	2	1
IIT723	Modern operating systems Lab	CC	-	-	2	1
IIT 724	Signal and Image Processing Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
IIT730	Immunotechnology	DE	3	-	-	3
IIT731	Carbon nanomaterial Design and applications	DE	3	-	-	3
IIT732	Psychology of mind	DE	3	-	-	3
IIT733	Energy Safety and hazard control	DE	3	-	-	3
BCS701	Communication Skills-V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT701 FLG701 FLS701 FLC701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**26**

Integrated M.Tech Converging Technology : ICN (VII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICN701	Principle and techniques of neurosciences	CC	3	-	-	3
ICN702	Psychology of mind	CC	3	-	-	3
ICN703	Introduction to dynamical system for neuroscience	CC	3	-	-	3
ICN 704	Neuroanatomy	CC	3	-	-	3
ICN 705	Research Methodology	CC	3	-	-	3
ICN 721	Principle and techniques of neurosciences Lab	CC	-	-	2	1
ICN722	Psychology of mind Lab	CC	-	-	2	1
ICN723	Introduction to dynamical system for neuroscience Lab	CC	-	-	2	1
ICN724	Neuroanatomy Lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
ICN730	Immunotechnology	DE	3	-	-	3
ICN731	Nanomaterial Design and applications	DE	3	-	-	3
ICN732	Modern operating systems	DE	3	-	-	3
ICN733	Energy Safety and hazard control	DE	3	-	-	3
BCS701	Communication Skills-V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT701 FLG701 FLS701 FLC701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					26

Integrated M.Tech Converging Technology : IET (VII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
IET701	Environmental Impact Assessment	CC	3	-	-	3
IET702	Energy management and technology	CC	3	-	-	3
IET703	Energy Safety and hazard control	CC	3	-	-	3
IET 704	Atmospheric Science	CC	3	-	-	3
IET 705	Research Methodology	CC	3	-	-	3
IET721	Environmental Impact Assessment Lab	CC	-	-	2	1
IET722	Energy management and technology Lab	CC	-	-	2	1
IET723	Energy Safety and hazard control Lab	CC	-	-	2	1
IET 724	Atmospheric Science lab	CC	-	-	2	1
DE Electives: Student has to select 1 course from the list of following DE electives						
IET730	Immunotechnology	DE	3	-	-	3
IET731	Carbon nanomaterial Design and applications	DE	3	-	-	3
IET732	Modern operating systems	DE	3	-	-	3
IET733	Psychology of mind	DE	3	-	-	3
BCS701	Communication Skills-V	VA	1	-	-	1
BSS705	Understanding Self for Effectiveness – VII	VA	1	-	-	1
FLT701 FLG701 FLS701 FLC701	Foreign Language - VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					26

Integrated M.Tech Converging Technology : IBB (VIII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
IBB801	Pearl and python	CC	3	-	-	3
IBB802	Data Mining	CC	3	-	-	4
IBB803	Protein Engineering	CC	3	-	-	4
IBB804	Animal and Plant biotechnology	CC	3	-	-	4
IBB805	Intellectual property rights	CC	3	-	-	3
IBB821	Pearl and python Lab	CC	-	-	2	1
IBB822	Data Mining Lab	CC	-	-	2	1
IBB823	Protein Engineering Lab	CC	-	-	2	1
IBB824	Animal and Plant biotechnology Lab	CC	-	-	2	1
BCS801	Communication Skills-VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT801 FLG801 FLS801 FLC801	Foreign Language - VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**23**

Integrated M.Tech Converging Technology : INN (VIII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
INN801	Nanomedicine and Nanotoxicology	CC	3	-	-	3
INN802	Optoelectronic Devices	CC	3	-	-	3
INN803	Nanocomposites	CC	3	-	-	3
INN804	Nanotechnology Business Applications and Commercialization	CC	3	1	-	4
INN805	Intellectual property rights	CC	3	-	-	3
INN821	Nanomedicine and Nanotoxicology Lab	CC	-	-	2	1
INN822	Optoelectronic Devices Lab	CC	-	-	2	1
INN823	Nanocomposites Lab	CC	-	-	2	1
BCS801	Communication Skills-VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT801 FLG801 FLS801 FLC801	Foreign Language - VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					23

Integrated M.Tech Converging Technology : IIT (VIII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
IIT801	Microwave Engineering	CC	3	-	-	3
IIT802	Mobile computing	CC	3	-	-	3
IIT803	Network Security and cryptography	CC	3	-	-	3
IIT804	Electronic Commerce	CC	3	-	-	3
IIT805	Intellectual property rights	CC	3	-	-	3
IIT821	Microwave Engineering Lab	CC	-	-	2	1
IIT822	Mobile computing Lab	CC	-	-	2	1
IIT823	Network Security and cryptography Lab	CC	-	-	2	1
IIT824	Electronic Commerce Lab	CC	-	-	2	1
BCS801	Communication Skills-VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT801 FLG801 FLS801 FLC801	Foreign Language – VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**23**

Integrated M.Tech Converging Technology : ICN (VIII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICN801	Neurolinguistics	CC	3	-	-	3
ICN802	Clinical Neurosciences	CC	3	-	-	3
ICN803	Computational Neurosciences	CC	3	-	-	3
ICN804	Neuroimaging methods in cognitive neuroscience	CC	3	-	-	3
ICN805	Intellectual property rights	CC	3	-	-	3
ICN821	Neurolinguistics Lab	CC	-	-	2	1
ICN822	Clinical Neurosciences Lab	CC	-	-	2	1
ICN823	Computational Neurosciences Lab	CC	-	-	2	1
ICN824	Neuroimaging methods in cognitive neuroscience Lab	CC	-	-	2	1
BCS801	Communication Skills-VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT801 FLG801 FLS801 FLC801	Foreign Language - VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**23**

Integrated M.Tech Converging Technology : IET (VIII – SEMESTER)						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
IET801	Waste water treatment	CC	3	-	-	3
IET802	Environmental pollution and legislation	CC	3	-	-	3
IET803	Environmental Engineering	CC	3	-	-	3
IET804	Separation Processes in Environmental Applications	CC	3	-	-	3
IET805	Intellectual property rights	CC	3	-	-	3
IET821	Waste water treatment Lab	CC	-	-	2	1
IET822	Environmental pollution and legislation Lab	CC	-	-	2	1
IET823	Environmental Engineering Lab	CC	-	-	2	1
IET824	Separation Processes in Environmental Applications Lab	CC	-	-	2	1
BCS801	Communication Skills-VI	VA	1	-	-	1
BSS805	Understanding Self for Effectiveness – VIII	VA	1	-	-	1
FLT801 FLG801 FLS801 FLC801	Foreign Language - VIII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**23**

Integrated M.Tech Converging Technology : IX & X – SEMESTER						
Course Code	Course Title	Category	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Credits
ICT 960	Project with converging technology approach & domain approach	CC	-	-	-	40

PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS

Course Code: ICT101   **L:3,T:1,P:2, C:5**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering.
Course Contents:

Module I: Properties of Matter:

Elasticity: Hook's Law, Young's Modulus, Bulk Modulus, Shear Modulus, Poisson's ratio, Relations between elastic constants. Twisting couple on a Cylindrical Rod, Bending of Beams, Bending moments, Cantilever.

Viscosity: Viscosity, Critical velocity, Flow of a Liquid through a Capillary Tube, Poiseuille's equation, Capillaries in series and parallel, Stoke's Formula.

Surface Tension: Molecular Forces, Surface energy, Shape of drops, Pressure difference across a Curved Surface, Expression for Excess Pressure on a curved surface, Film of Water between two Glass plates, Shape of liquid meniscus in a capillary tube, Capillary action, Rise of liquid in a conical Capillary tube, Vapor pressure and Surface tension.

Module II: Thermal Physics:

Concept of thermodynamic state, the first law of thermodynamics: heat and work, internal energy. second law of thermodynamics: concept of entropy and temperature, principle of increase of entropy. thermodynamic variables: enthalpy, Helmholtz potential, Gibbs free energy, Phase transformations: first order and second order, Clausius-Clapeyron equation. Production of low temperature: Joule-Thomson experiment, regenerative cooling, cooling by adiabatic demagnetization.

Module III: Optics:

Diffraction of light: Fresnel's half period zones, explanation of rectilinear propagation of light, zone plate, Fresnel's diffraction at a straight edge, Fresnel's diffraction at a circular aperture, Fraunhoffer diffraction.

Resolving Power: Geometrical and spectral resolution, distinction between magnification and resolution, Rayleigh's criterion for the limit of resolution, resolving power of plane diffraction grating, resolving power of a prism.

Polarization of light: Concept of polarization, polarization by reflection, Brewster's law, polarization by refraction, pile of plates, double refraction, Huygens explanation of double refraction through uniaxial crystals, Nicol prism, phase retardation plates, elliptically and circularly polarized light, detection of plane, elliptically and circularly polarized light and optical rotation - laws of rotation of plane of polarization.

Laser system: Spontaneous & stimulated emission, absorption, Einstein coefficients (only definitions), population inversion, optical &electrical pumping , cavity resonators, properties of lasers, Ruby laser, Helium- Neon laser, uses of laser, idea of holography (qualitative treatment only).
Optical fibers: Structure and types of fibers, fiber optic communication system.

Examination Scheme:

Components	CT	Attendance	Assignment/	EE

			Project/Seminar/Quiz	
Weightage (%)	15	5	10	70

Text & References:

- **Berkeley Physics Course Vol 1 & 3**
- **Engineering Physics Malik & Singh Mcgraw Hill Education Pvt. Ltd, 2013**.
- Thermodynamics, Kinetic, Theory of Gases and Statistical Mechanics-Sears. THIRD **EDITION ,Publisher**: Addison Wesley.
- **"OPTICS" by AJOY GHATAK** - 3rd ed. "Tata McGraw Hill **Publishing** Company Limited" New Delhi.

Fundamentals Inorganic & Organic Chemistry

Course Code: ICT102   **L:3,T:1,P:2, C:5**

THEORY
Course Objective:
Aim of this course is to introduce the students to fundamentals of inorganic and organic chemistry which form the basis of all branches of applied sciences and engineering.

Course Contents:

Module I: Polymers

Inorganic Polymers: Homo and heterocatenated inorganic polymers. Polyphosphazenes: synthetic routes and bonding features. Polysilanes: sigma bond delocalization in polysilanes and its implications. Structural aspects and applications of boranes and silicones

Organic polymers: Mechanism of addition and condensation polymerization, copolymerization and coordination polymerization, Zeigler – Natta catalysts, thermosetting and thermoplastic polymers, Synthesis and applications of Dacron, terylene, Nylon 66, Bakelite, melamine and polyacrylonitriles.

Module II: Mechanism of Organic Reactions and Stereochemistry

Mechanism of Organic Reactions: Homolytic and Heterolytic bond fission. Types of organic reactions, electrophiles and nucleophiles. Reactive intermediates: generation, structure and reactivity of carbocations, carbanions, free radicals, carbenes, arynes and nitrenes.

Stereochemistry: Concept of stereoisomerism, structural representation of stereoisomers, Elements of symmetry, chirality, enantiomers, stereogenic centre, optical activity, optical activity of molecules with two stereogenic centre: diastereoisomers, threo and erythro isomers, meso compounds, resolution, inversion, retention and racemization, IUPAC conventions for optical and geometrical isomers, geometrical isomerism in oximes and alicyclic compounds.

Conformations and conformational analysis – ethane, n-butane and cyclohexane. Resolution of racemates - chemical and enzymatic methods.

Module III: Arenes and Aromaticity

Conjugation and aromaticity, structure of benzene, Huckel's (4n+2) rule and its applications to aromatic hydrocarbons. Mechanism of electrophilic substitution (halogenation, nitration, sulphonation, Friedel-Crafts reaction). Effect of substituent groups (inductive, mesomeric and hyperconjugative effects), Activating and deactivating groups, directive influence and orientation.

Module IV: Transition metal complexes and Organometallics

Transition metal complexes**:** Crystal field theory, basic concepts, crystal field effects in tetrahedral and octahedral geometry, pairing energies, weak field and strong field case, crystal field stabilization energy, factors affecting magnitude of 10Dq, high and low spin complexes, evidences for crystal field stabilization, tetragonal distortions, electronic spectra and magnetism.

Organometallics: EAN rule, metal carbonyls – synthesis, bonding and structure, metallocenes – synthesis and properties, Homogeneous and heterogeneous catalysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Morrison R. T. and Boyd R. N.(2014) Organic Chemistry,7th edition, Pearson.
- Smith M. B. and March J.(2007) Reaction Mechanisms and structure, 6th edition, Wiley and Sons publications.
- Finar I. L. (1963) Organic Chemistry :The fundamental Principles, 4th edition,Longmans.
- Lee, J. D. (1991) Concise Inorganic Chemistry, 4th edition, Chapman and Hall.
- Cotton F. A. and Wilkinson G.(1972) Advanced Inorganic Chemistry, 3rd edition, Interscience Publishers
- Charles E. Carraher Jr.(2010) Introduction to Polymer Chemistry, 2nd edition, CRC press.
- Shriver D. F. and Atkins A. W. (1999) Inorganic Chemistry, 3rd Edition, ELBS, Oxford Press.
- Kalsi P. S. , Stereochemistry , New Age International.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

Course Code: ICT103   **L:3,T:1,P:2 C:05**

THEORY
Course Objective:
The course aims on understanding of the relationships between structure and function in the major classes of biochemical and molecular pathways. It augurs understanding on central metabolic process and the role of enzymes in modulating pathways.

Course Contents:

Module I: Foundations of Biochemistry
Cellular foundations, Chemical foundations, Physical foundations, Genetic foundations, Evolutionary foundations. Weak interactions in aqueous solutions, Ionization, Buffer

Module II: Proteins and Enzymes
Amino acids, Peptides and proteins, Structure of proteins – primary, secondary, tertiary and quaternary, protein denaturation and folding. Introduction to enzymes, Mechanism of action of enzymes.

Module III: Carbohydrates and lipids
Carbohydrates - Monosaccharides, Disaccharides and Polysaccharides, Lipids - Storage and structural lipids

Module IV: Structure of DNA and RNA
DNA Structure, Polynucleotide Chains, Hydrogen Bonding, Double Helix, Minor and Major Grooves, Circular DNA, Topoisomerases, Supercoiling in DNA, RNA structure, Complex tertiary RNA structures.

Module V: DNA replication and Repair
Chemistry of DNA synthesis, Mechanism of DNA polymerase, Replication fork, Specialization of DNA polymerases, DNA synthesis at the replication fork, Initiation of DNA replication, Binding and unwinding: origin selection and activation by the initiator protein, Finishing replication. Replication errors and their repair, DNA damage, Repair and tolerance of DNA damage

Module VI: Transcription and Translation
RNA polymerases and the transcription cycle, σ-factor, Transcription cycle in bacteria – Initiation, elongation and termination. Genetic code, Messenger RNA, Transfer RNA, Ribosomes, Mechanisms of translation - Initiation, elongation and termination.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox, Worth Publishing
- Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
- Watson J. D, Gann A, Baker T. A, Levine M, Bell S.P, Losick R (2013). Molecular Biology of the gene (7th edition).

Programming language fundamental & Programming in C

Course Code: ICT104   **L:3,T:1,P:2, C:5**

Course Objective:
The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity.

Course Contents:

Module I: Computer Fundamentals
Application software, System Software, Compilers, Interpreters etc. Number System-Binary, Hexadecimal, Octal, and Decimal. Conversion from one number system to another.

Module II: Introduction to 'C' Language
Character set, Variables Identifiers, Data type, Arithmetic operation, Constant, operators, Expression, Assignments, basic input/output statements, Simple 'C. Programs.
Decision making in program, Relational Logical operators, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loops.

Module III: Arrays and Functions
One Dimensional Arrays, Arrays Manipulation, Sorting, Searching, Passing Arguments, call by value and call by references, Recursion and recursive functions.

Module IV: Pointers
Pointers: Declaration, Pointer assignments, initialization, Pointers and Dynamic Memory Allocation, Discuss Array of Pointers .

Module V: Structure and Union
Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays and Arrays of Structure, Union

Evaluation:

Components	Other Components	Attendance	MTE	ESE
Weightage (%)	15	10	5	70

Text & References:
Text:
- Problem Solving through C language, E. Balagurusamy, TMH publication.
- Peter Nortons, "Introduction to Computers", TMH

References:
- Let us C, Yashwant Kanetkar, BPB Publication.
- P.K. Sinha, "Computer Fundamentals", BPB Publications
- V. Rajaraman, "Computer Fundamentals", Prentice Hall
- Dromey. G, "How to Solve it by Computer, Prentice Hall
- Peter Nortons, "DOS Guide" , Prentice Hall
- Gottfried, "Programming in C", Schaum, Tata McGraw Hill
- Y. Kanetkar, "Let us C", BPB Publications
- Y. Kanetkar, "Understanding Pointers" , BPB Publications
- Schidlt, "The Complete Reference of C", Tata McGraw Hill

Foundation Course in Mathematics

Course Code: ICT105   **L:3,T:0,P:0, C:3**

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all disciples. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics.

Course Contents:

Module 1: Complex Numbers   **(4)**

Definition, real and imaginary parts, complex conjugate, representation of a complex number in a plane, modules and argument of a complex number, algebra of a complex numbers, cube root of unity.

Module 2: Sequences and Series   **(6)**

Sequences, series (finite and infinite) 4th term, arithmetical progression (A.P.) sum of n terms of an A.P. arithmetic mean (A.M.), Geometric progression (G.P) sum of n terms and infinite terms of a G.P., Geometric mean (G.M.), Harmonic progression (H.P.) Harmonic Mean (H.M.) Relation between A.M., G.H, H.M, series representation of exponential functions, logarithmic functions, $\log_e$, $(1 + x)$ and $\log_e$ (1- x).

Module 3: Permutation and Combination   **(5)**

 Fundamental principle of counting, Factorial rotation, Permutation as an arrangement, meaning of P (n,r). Combination-meaning of C (n,r), Applications of permutation and combinations.

Module 4: Binomial Theorem   **(4)**

Statement and proof of Binomial theorem of positive integral exponent. General and middle terms in Binomial expansions. Properties of Binomial coefficients.

Module 5: Matrices and Determinants   **(6)**

multiplication of matrices, rank of matrix, elementary row and column transformation, inverse of a matrix, solution of linear equations in two or three variables using inverse of a matrix; Determinants of a square matrix, properties of determinates

Module 6: Co-ordinate Geometry of two-dimensional   **(5)**

Point: definition, Cartesian system of coordinates in a place, distance and section formula, condition for collinearity of three points in a place, equation of a straight line slope form, intercept form, two point form, general form: parallel and perpendicular line, intercept of a line, angle between two lines.

Standard and general forms of circle, equation of a circle when and points of a diameters points of intersection of a line and a circle, condition of tangency of a line and a circle, conic section: definition, focus, directrix, eccentricity, equations of parabola, ellipse and hyperbola.

Examination Scheme:

Components	A	CT	HA/ S/V/Q	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- H. K. Das, Higher Enginering Mathematics, S. Chand Publishing.
- Erwin Kreyszig, Advanced Engineering Mathematics, Wiley.
- B. V. Ramana, Higher Engineering Mathematics, Tata Mc.Graw Hill Edu.
- Mathematics, text book for XI, NCERT.
- Mathematics-I and II text book for XII, NCERT.

Foundation Course in Biology

Course Code: ICT106   **L:3,T:0,P:0, C:3**

THEORY
Course Objective:
The objective of the course is to provide students an understanding of the very basic molecules of life-DNA,RNA, proteins and how these molecules, when form further complex molecules like carbohydrates, vitamins and lipids, then functioning of body takes place.

Course Contents:
Module1. Diversity in Living World
What is living?; Biodiversity; Need for classification; Three domain of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy– Museums, Zoos, Herbaria, Botanical gardens. Five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids. Salient features and classification of plants into major groups.

Module2. Cell Structure and functions
Cell; the basic unit of life. Biomolecules – Lipids, polysaccharides, Proteins, and nucleic acids. Enzymes and cofactors, their classification, chemistry, mechanism of action and factors affecting enzyme activity. Cell cycle and cell division, stages of mitosis and meiosis, and their significance.

Module3. Biology and Human Welfare
Health and Disease: Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology–vaccines; Cancer, HIV and AIDs; Adolescence, drug and alcohol abuse. Improvement in food production: Plant breeding, tissue culture, single cell protein, Biofortification; Apiculture and Animal husbandry.

Module4. Genetics and Evolution
Principles of inheritance and variation – Mendals laws, inheritance of one gene and two gene, sex determination, mutation and genetic disorders. Molecular basis of inheritance – DNA, RNA, Replication, Transcription, Genetic code, Translation, regulation of gene expression, DNA fingerprinting, Human Genome Project. Evolution – Origin of life, theory of evolution of life forms, Evidences for evolution, Adaptive radiation, Biological evolution, Hardy-Weinberg principle.

Module5. Biotechnology and Its Applications
Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology). Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms- Bt crops; Transgenic Animals; Biosafety issues– Biopiracy and patents.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biology Text book for class XI, NCERT.
- Biology Text book for class XI, NCERT.
- Berg, Jeremy M., John L. Tymoczko, and Lubert Stryer. "Biochemistry." 475–477] (WH Freeman and New York, 2011) (2002).
- Lodish, Harvey. Molecular cell biology. Macmillan, 2008.

Properties of Matter, Thermal Physics and Optics –Lab

Course Code: ICT121   **C: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.

9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Fundamentals of Inorganic and Organic Chemistry Practicals

Course Code: ICT122   **C: 01**

List of Experiments

1. To synthesize phenol formaldehyde resin.

2. To synthesize urea formaldehyde resin.

3. Iodometry titration: Estimation of sodium thiosulphate and potassium dichromate.

4. Volumetric analysis: Oxidation reduction titration using $KMnO_4$ and $K_2Cr_2O_7$.

5. Preparation of chrome alum.

6. Qualitative analysis of inorganic mixtures, containing not more than four ionic species (excluding insoluble substances).

7. Purification of organic compounds by crystallization (from water or alcohol).

8. Purification of liquid organic compounds by distillation.

9. Qualitative Analysis: Separation, purification and identification of compounds of binary mixture, derivative preparation and confirmatory tests.

10. To synthesize the paracetamol and determine percentage yield of the product.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Reference books:
1. Vogel A.I., "A Textbook of Quantitative Inorganic Chemistry", Longman
2. Vogel A.I., "A Textbook of Practical Organic Chemistry", Longman

BIOCHEMISTRY AND MOLECULAR BIOLOGY LAB

Course Code: ICT123   **C: 01**

List of Experiments

1. Preparation of bacterial genomic DNA
2. Agarose gel electrophoresis
3. Preparation of plant genomic DNA
4. Preparation of plasmid DNA
5. Estimation of protein
6. Estimation of carbohydrate
7. Estimation of DNA
8. Estimation of RNA

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Programming language fundamental & Programming in C-Lab

Course Code: ICT124   **C: 01**

1. Write a program to find the area and perimeter of (I) square (ii) rectangle.
2. Write a Program to find the sum of first n natural numbers.
3. Write a program to calculate the average of n numbers.
4. Write a program to check whether the number is even or odd.
5. Write a program to find largest of three numbers.
6. Write a program to swap the values of two given variables.
7. Write a program to find the square of a given number.
8. Write a program to calculate the roots of a quadratic equation.
9. Write a program to compute the sum of squares of n natural numbers.
10. Write a program to reverse a given number and also calculate the number of digits in the number.
11. Write a program to calculate the sum of digits of a given number.
12. Write a program to calculate the factorial of a given positive number.
13. Write a program to generate fibonaaci series upto n terms.
14. Write a program to find the GCD and LCM of two given positive numbers.
15. Write a program to print first n prime numbers.
16. Write a program to print 1 if input character is capital, 2 if input character is a lowercase alphabet, 3 if input character is a digit and 4 if some other special character.
17. Write a C program to check whether a number is an Armstrong number.
18. Write a C program to find the power of a number.
19. Write a C program to find the sum of n terms of the series: $n-n*2/2!+n*3/3!-n*4/4!+\ldots\ldots$
20. Write a C program to find the maximum/minimum number in a given array.
21. Write a C program to search a number in an array using linear search.
22. Write a C program to sort a given array using Bubble sort.
23. Write a C program to concatenate two one-dimensional arrays.
24. Write a C program to add, subtract and multiply two m by n matrices.
25. Write a C program to detect the occurrence of a character in a given string.
26. Write a C program to count the number of characters in a given string with and without using strlen () function,
27. Write a C program to copy the contents of one string to another with and without using strcpy () function.
28. Write a C program to determine whether the entered character string is palindrome or not.
29. Write a C program to enter the marks, address of several students and prepare the mark sheet of each student. Use structures.
30. Write a C program to calculate net salary / printing of salary statement of an employee. Use Structures.
31. Write a C program to calculate the factorial of a number using recursion.
32. Write a C program to generate a fibonacci series using recursion.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGLISH

Course Code: BCS 101   **L:1, T:0, P:0, C:1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills,Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas,Structure of Paragraph,Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems
All the Worlds a Stage   Shakespeare
To Autumn   Keats
O! Captain, My Captain.   Walt Whitman
Where the Mind is Without Fear   Rabindranath Tagore
Psalm of Life   H.W. Longfellow

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:
- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

* 30 hrs Programme to be continued for Full year

UNDERSTANDING SELF FOR EFFECTIVENESS - I
(UNDERSTANDING SELF FOR EFFECTIVENESS)

Course Code: BSS105   **L:1, T:0, P:0, C:1**

Course Objective:
 This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

Course Contents:

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Davis, K. Organizational Behaviour,
- Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
- Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
- Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G. (1985). Oxford Textbook of Public Health, Vol. 4.
- LaFasto & Larson. (2001). When Teams Work Best, Response Books (Sage), New Delhi.
- Pfeiffer J W. (1996). Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group Pfeiffer & Company.
- Smither R. D. (1994). The Psychology of Work and Human Performance, Harper Collins College Publishers.

FRENCH - I

Course Code: FLT 101   **L:2, T:0, P:0, C:2**

Course Objective:
To familiarize the students with the French language
- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2
Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1: Découvrir la langue française : (oral et écrit)
1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance
1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps
1. dire la date et l'heure

Contenu grammatical:
    1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - I

Course Code: FLG 101   **L:2, T:0, P:0, C:2**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?:   Danke gut!, sehr gut!, prima!, ausgezeichnet!,
                       Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: FLS 101   **L:2, T:0, P:0, C:2**

Course Objective:
To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – I

Course Code: FLC 101   **L:2, T:0, P:0, C:2**

Course Objective:
There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea ………….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

Semiconductor, Electronic devices & Applications

Course Code: ICT201   **L:3,T:1,P:2, C:5**

Course objective: The main aim of the course is to give concept of Electronics which are useful for research and industrial application.

Content:

Module I

Energy band theory of crystals, energy band structure of insulators, semiconductors and metals. Mobility and conductivity, Electrons and holes in Intrinsic Semiconductor, Elementary properties of Germanium and Silicon, Donor and Acceptor Impurities, Extrinsic semi-conductors, Generation and recombination of charges, diffusion.

Module II:
The p-n junction diode, depletion region, p-n junction diode as a rectifier, current components of a p-n diode, Ideal Voltage Ampere characteristics, semiconductor photodiode, photovoltaic effect light emitting diodes

Module III

 Half-wave and Full-wave rectifiers, ripple factor, efficiency, voltage regulation, inductor filters, capacitor filters, L and pie section filters, regulated power supplies

Module IV
Bipolar Junction transistors, bipolar transistor action, basic principle of operation open circuited transistor, transistor biased in the active region, current components in a transistor, characteristic curves in common emitter, common base and common collector configuration, expressions of a transistor in h-parameters. Transistor as an amplifier, characteristics of an amplifier.

ModuleV
Feed-back concepts and Oscillators. Elementary information about Field Effect transistor, thyristors, opto-electronic devices and display devices.

ModuleVI
Logic gates (AND, OR, NOT, XOR, NAND and NOR) Logic operation of logic gates using diodes and transistors. Introduction to integrated Circuits (IC). (7)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Jacob Millman and Christos C. Halkias Integrated electronics, volume I, *Publisher*: McGraw Hill Education (India) Private Limited; 2*edition*
- G.K. Mithal, Electronics Devices and circuits, *Vol* 1,Khanna *Publishers*, 1997*Edition*
- R.P. Punagin, Basic Electronics, 1st *Edition Volume-IV* , *Publisher* : Tata McGraw - Hill
- Donald A. Neamen, Semiconductor Physics and Devices, *Volume* IV (2nd *Edition*) *Publisher*: Tata Mcgraw Hill Education Private Limited

Physical Chemistry

Course Code: ICT202   **L:3,T:1,P:2, C:5**

THEORY
Course Objective:
Aim of this course is to introduce the students to fundamentals of physical chemistry which are the basic need for further research and development in any field of science and engineering.
Course Contents:
Module I: Liquid and Solid State

Liquid State: Structural differences between solids, liquid and gases. Properties of liquid: Vapor pressure, viscosity and surface tension and their variation with temperature.

Solid State: Difference between crystalline and amorphous solids, isotropy and anisotropy, Symmetry in crystal systems, space lattice, unit cell. Laws of crystallography- (i) Laws of constancy of interfacial angles, (ii) Law of rationality of indices, (iii) law of symmetry Bravias lattices. Bragg's equation. Imperfections in crystals.

Module II: Colloidal State

Colloidal State: Difference between true and colloidal solution, Classification: lyophillic and lyophobic colloids, preparation of colloidal solutions, Tyndall effect, Brownian effect, electrophoresis and electro–osmosis, general applications of colloids, Surfactants, micelles and their classification, critical micelle concentration (CMC). Method of determination of CMC.

Module III: Phase Equilibria

Definitions of terms: phase, component, and degrees of freedom, one component system- water and sulphur, Restricted phase rule, condensed systems, Simple eutectic systems and thermal analysis via cooling curves. Two component system-lead and silver system (Pattinson process for desilverisation of lead).

Module IV: Chemical Kinetics

Rate of a reaction and factors influencing the rate of a reaction (concentration, temperature, pressure, solvent, light, catalyst), Order and molecularity of a chemical reaction, Mathematical representations of zero order, first order, and second order reactions, pseudo order reactions , Determination of the order of reaction-differential method, method of integration, method of half-life period and isolation method. Experimental methods of chemical kinetics: conductometric, potentiometric and optical methods.

Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy, Expression for the rate constant based on equilibrium constant and thermodynamics.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
- Castellan G. W. (1995) Physical Chemistry,3rd edition, Narosa.
- Atkins P. W. and Paula J. de, Atkin's Physical Chemistry, Oxford University Press.
- Puri B. R., Sharma L. R. and Pathania M.S.(1999) Principles of Physical Chemistry.
- McQuarrie D. A. and Simon J. D., Physical Chemistry: A Molecular Approach, Univ. Science Books.

Cell Biology & Genetics

Course Code: ICT203 **L:3,T:1,P:2, C:5**

THEORY
Course Objective:
Cell Biology and genetics plays a central role to connect the different fields of biotechnology, which is highly interdisciplinary. The objective of the present course is to understand the structure and function of the cellular and subcellular components of cells and tissues with the help of these recent techniques.

MODULE 1.

Cells: The fundamental units of life: Unity and diversity of cells, Cells under the microscope, Prokaryotic and eukaryotic cell, Model organism

Chemical components of cells: Chemical bonds, Small molecules in cells, Macromolecules in cells

MODULE 2.

Membrane structure: The lipid bilayer, Membrane proteins

Transport across cell membrane: Principles of transmembrane transport, Transporters and their functions, Ion channels and the membrane potential, Ion channels and nerve cell signalling

MODULE 3.

Intracellular compartments and protein transport: Membrane enclosed organelles, Protein sorting, Vesicular transport, Secretory pathways, Endocytic pathways

Cell signalling: General principles of cell signalling, G-protein couples receptors, Enzyme coupled receptors

Cytoskeleton: Intermediate filaments, Microtubules, Actin filaments, Muscle contraction

MODULE 4.

The cell division cycle: Overview of the cell cycle, The cell-cycle control system, G_1 phase, S phase, M phase, Mitosis, Cytokinesis, Control of cell number and cell size

MODULE 5.

Sexual reproduction and the power of genetics: The benefits of sex, Meiosis and fertilization, Mendel and the laws of inheritance, Genetics as an experimental tool

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., Roberts & Walter, P. (2013). Essential cell biology. Garland Science IV edition.

Object Oriented Programming in C++

Course Code: ICT204   **L:3,T:1,P:2, C:5**

Course Objective:
C++ is one of the most widely used programming languages for solving problems. The objective of this course is to provide object oriented programming fundamentals using C++. Topics to be covered include fundamentals of syntax & semantics of C++, loops & decisions, functions, classes and structures and features of classes such as overloading and inheritance, files, streams, pointers etc.

Course Contents:

Module I: Overview of C++
What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++.
Basics:-Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types-Integer, Float, character, Enumerated data types, library functions, comments, storage classes, type conversion, arithmetic operators, arrays and strings

Module II: Loops and Decisions
Relational operators, Logical operators, Decisions-if, if-else and switch. Loops-for, while, do-while and nested loops, precedence summary, break, continue and goto statements.
Functions: Simple functions, passing arguments to functions, returning values from functions, reference arguments, returning by reference, Overloaded functions

Module III: Structures
A simple Structure, specifying the Structure, defining the structure variable, assessing members of structure, structure within structure, assessing structure members using pointers
Classes and objects: A simple class, C++ objects as physical objects, Constructors, Destructors, objects as function arguments, returning objects from functions, static class data, array as class data member, array of objects.

Module IV: Operator Overloading & Inheritance
Overloading unary operator, Overloading binary operator, data conversion. Inheritance: Derived and Base class, Derived class Constructor, types of Inheritance , Abstract base class , public and private Inheritance, level of Inheritance

Module V: Pointers and Virtual functions
Pointers and Arrays, pointers and strings, pointers and functions, pointers to objects, virtual functions, friend functions, static functions, this pointer

Evaluation:

Components	Other Components	Attendance	MTE	ESE
Weightage (%)	15	10	5	70

Text & References:

- The complete reference C++, Herbert Schildt
- Programming with C++, Ravi Chandran
- Mastering C++, Venugopal
- Programming in C++, SCHAUM's series

Calculus

Course Code: ICT205   **L:3,T:0,P:0, C:3**

Course Objective:
This subject provides students with an in-depth education in the conceptual foundations of Mathematics. It allows them to apply mathematics to converging technology and a variety of other disciplines in engineering and outside. Combined with a strong education in mathematics, sciences, and the liberal arts it prepares students to be leaders in converging technology, applications to other disciplines, and research.

Course Contents:
Module-I
Limits and Continuity: Definition; Rate of Change, Limit, functions of one variable, function of a function: Rules for Finding Limits (simple problems), Continuity, simple
examples of discontinues functions.

Module-II
 Derivatives: Definition: differentiability, differentiation by abridges method (simple algebraic and trigonometrical functions), differentiation rules (sum, difference, product, division of two functions) differential functions and logarithmic functions, partial differentiation of functions of one or two variable.

Module-III
Applications of Derivatives: Mean Value tucroms Rolles, Cauchy and Lagrange's, maxima and minima of one variable, indeterminate form: L' Hospital rule, Euler's formula.

 Module-IV
Integration: Integral as converse of differentiation, indefinite integral, integration by substitution, integration of product of two functions, definite integrals: properties and problems, substitution in definite integrals, numerical integration (Trapezoidal), 1/3rd Simpsons
rule and 3/8th Simpson's rule), area of circle, parabola ex, log ex.

Recommended Books:
1. Calculus by Thomas and finny, Pearson Education Asia, 1999.

Semiconductor, Electronic devices & Applications: Lab

Course Code: ICT221   **C: 01**

List of Experiments:

1.   To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.

2.   To determine the thickness of a given wire by Wedge method.

3.   To determine the wavelength of He-Ne laser light using single slit.

4.   To determine the frequency of an electrically maintained tunning fork by Melde's method.

5.   To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.

6.   To draw the V – I characteristics of a forward and reverse bias PN junction diode.

7.   To determine the frequency of AC mains using sonometer.

8.   To determine the energy band-gap of Germanium crystal using four probes method.

9.   To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.

10.   To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.

11.   To study the characteristics of photo voltaic cell (solar cell).

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Physical Chemistry Practicals

Course Code: ICT 222 L C:01

List of Experiments

1. To draw the pH-titration curve of strong acid versus strong base.

2. Determination the viscosity of given liquid by Ostwald's viscometer.

3. Determination of the strength of strong and weak acids in a given mixture conductomerically.

4. Determination of surface tension of liquid.

5. Application of surface tension method in mixture analysis.

6. Heat of neutralization of a strong acid and a strong base.

7. To determine the partition coefficient of iodine between carbon tetrachloride and water.

8. To study the adsorption of acetic acid on activated charcoal.

9. To construct the phase diagram for two component system.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Reference Books:
1. Finlay A. and Kitchener J.A., "Practical Physical Chemistry, Longman
2. Shoemaker D.P. and Garland C.W., "Experimental Physical Chemistry", McGraw-Hill

CELL BIOLOGY & GENETICS LAB

Course Code: ICT223   **C: 01**

List of Experiments

11. Microscopy: Light microscopy, Bright field, Phase contrast

12. Study of chromoplasts, chloroplast in plant cell

13. Isolation of chloroplast from spinach

14. Study of apoptosis

15. Mitosis

16. Meiosis

17. Study of apoptosis

18. Cell quantification

19. Cell viability

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Object Oriented Programming in C++-Lab

Course Code: ICT224   **C: 01**

List of experiments:

1. WAP to calculate factorial of a given number n.
2. WAP to check whether a number is prime or not.
3. WAP to print Fibonacci series of 'n' numbers, where n is given by the programmer.
4. WAP to do the following:
    a. Generate the following menu:
        1. Add two numbers.
        2. Subtract two numbers.
        3. Multiply two numbers.
        4. Divide two numbers.
        5. Exit.
    b. Ask the user to input two integers and then input a choice from the menu. Perform all the arithmetic operations which have been offered by the menu. Checks for errors caused due to inappropriate entry by user and output a statement accordingly.
5. WAP to read a set of numbers in an array & to find the largest of them.
6. WAP to implement bubble sort using arrays.
7. WAP to sort a list of names in ascending order.
8. WAP to read a set of numbers from keyboard & to find sum of all elements of the given array using a function.
9. WAP to implement bubble sort using functions.
10. WAP to exchange contents of two variables using call by value.
11. WAP to exchange contents of two variables using call by reference.
12. WAP to find the sum of three numbers using pointer to function method.
13. WAP to display content of an array using pointers.
14. Calculate area of different geometrical figures (circle, rectangle,square, triangle) using function overloading.
15. WAP to add two complex numbers using friend function.
16. WAP to maintain the student record which contains Roll number, Name, Marks1, Marks2, Marks3 as data member and getdata(), display() and setdata() as member functions.
17. WAP to increment the employee salaries on the basis of there designation (Manager-5000, General Manager-10000, CEO-20000, worker-2000). Use employee name, id, designation and salary as data member and inc_sal as member function (Use array of object).
18. Write a class bank, containing data member: Name of Depositor, A/c type, Type of A/c, Balance amount. Member function: To assign initial value, To deposit an amount, to withdraw an amount after checking the balance (which should be greater than Rs. 500) , To display name & balance.
19. WAP to define nested class 'student_info' which contains data members such as name, roll number and sex and also consists of one more class 'date' ,whose data members are day, month and year. The data is to be read from the keyboard & displayed on the screen.
20. WAP to generate a series of Fibonacci numbers using copy constructor, where it is defined outside the class using scope resolution operator.
21. Write a class string to compare two strings, overload (= =) operator.
22. Write a class to concatenate two strings, overload (+) operator.
23. Create a class item, having two data members x & y, overload '-'(unary operator) to change the sign of x and y.
24. Create a class Employee. Derive 3 classes from this class namely, Programmer, Analyst & Project Leader. Take attributes and operations on your own. WAP to implement this with array of pointers.
25. Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager. Take suitable attributes & operations. WAP to implement this class hierarchy.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Environmental Sciences

Course Code: EVS001   **L:4,T:0,P:0, C:4**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
– Role of an individual in conservation of natural resources.
– Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity

Biogeographical classification of India

Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values

Biodiversity at global, national and local levels

India as a mega-diversity nation

Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts

Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution

Definition

    ◻◻◻Causes, effects and control measures of:

      a. Air pollution
      b. Water pollution
      c. Soil pollution
      d. Marine pollution
      e. Noise pollution
      f. Thermal pollution
      g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and   industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development

Urban problems and related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act

Air (Prevention and Control of Pollution) Act

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation

Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes

Environment and human health

Human Rights

Value Education

HIV / AIDS

Women and Child Welfare

Role of Information Technology in Environment and Human Health

Case Studies

Module VIII: Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.

Visit to a local polluted site – Urban / Rural / Industrial / Agricultural

Study of common plants, insects, birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text & References:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

ENGLISH

Course Code: BCS 201   **L:1, T:0, P:0, C:1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan

Glory at Twilight, Bhabani Bhattacharya

Module X: Poems
All the Worlds a Stage   Shakespeare
To Autumn   Keats
O! Captain, My Captain.   Walt Whitman
Where the Mind is Without Fear Rabindranath Tagore
Psalm of Life   H.W. Longfellow

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

UNDERSTANDING SELF FOR EFFECTIVENESS - II
(PROBLEM SOLVING AND CREATIVE THINKING)

Course Code: BSS205   **L:1, T:0, P:0, C:1**

Course Objective:
To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating
The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Michael S. (1999). How to be a Better Problem Solver, Kogan Page, New Delhi.
- Geoff P. (1999). How to be a Better at creativity; by: Kogan Page, New Delhi, (1999)
- Richard Y. C., & Keith P.,   (1998). Wheeler Publishing, New Delhi.
- Phil Lowe Koge (1996). Page: Creativity and Problem Solving, New Delhi,
- Pfeiffer, J. W., (1996). Theories and Models in Applied Understanding Self for Effectiveness, Management Pfeiffer & Company.
- Bensley, A. D. (1998). Critical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole Publishing Company.

FRENCH - II

Course Code: FLT 201   **L:2, T:0, P:0, C:2**

Course Objective:
To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
To make them learn the basic rules of French Grammar.

Course Contents:

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**
1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
    imaginer une conversation téléphonique/un dialogue
       Propositions- interroger, répondre
Unité 4: **Découvrir son environnement**
1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie
Unité 5 : s'informer
1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical: 1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice
Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN – II

Course Code: FLG 201   **L:2, T:0, P:0, C:2**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative
Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects
Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use
Module VIII: Dialogues
Dialogue reading: 'In the market place'   'At the Hotel'
Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice
Text & References:
- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: FLS 201   **L:2, T:0, P:0, C:2**

Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Posessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – II

Course Code: FLC 201   **L:2, T:0, P:0, C:2**

Course Objective:
Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"

- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.

Comprehension and answer questions based on it.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

ELECTRODYNAMICS AND QUANTUM MECHANICS

Course Code: ICT301   **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of spectroscopy which are the help in structure elucidation of chemical compounds.

Module I Special Relativity:

Special Relativity: empirical evidence for the constancy of c, frames of reference; Lorentz transformations; relativity of simultaneity; twin and other paradoxes, transformation laws for velocity, momentum, energy; mass-energy equivalence.(7)

Module II Electrodynamics:

Electromagnetic Induction and Maxwell's Equation:-Faraday's law of electromagnetic induction. Differential form of Faraday's law, Mutual inductance, mutual inductance two circular loops, self inductance of a solenoid of finite length and winding thickness, self inductance of a straight conductor. Energy stored in an inductor and in the magnetic field. transient behaviors of LR circuit. Displacement current, Modified Ampere's law Maxwell's equations in differential and integral form. Maxwell's equations in material media, Boundary conditions for electric and magnetic fields at vacuum-dielectric and vacuum-metal boundaries. (8)

Module III Quantum Mechanics:

Operators in quantum mechanics: Linear operator unitary operator, function operator, Adjoint of an operator, self adjointness, eigen values and eigen functions of self adjoint operator, Normalization of eigen functions, Completeness and closure relation.(5)

Introduction to Schrodinger wave Mechanics: Postulates of quantum – mechanics Schrodinger's equation, the wave function and its interpretation, the operator position , momentum and kinetic energy in one dimension, commutator, commutation relation involving position and momentum, uncertainty relation, compatible operator, Hamiltonian operator, eigen functions and eigen values, expectation value of dynamical variables, time dependent one-dimensional Schrodinger equation for a free particle and for a particle in a potential V (x,t). Relationship between the wave – function of a particle and measurement of its position, normalization condition for the wave function, Boundary and continuity conditions on the wave function. (7)

The time independent Schrodinger equation, and Stationary state solution, particle in one dimensional box, eigen function and eigen values, discrete energy levels, uncertainty product, generalization to three dimensions and degeneracy of levels. Finite potential well, Calculation of reflection and transmission coefficients. Tunnel Effect, Qualitative discussion of the application to decay, Square well potential problem calculation of transmission coefficient. Simple harmonic oscillator (One dimensional case, qualitative discussion of its eigen function, energy eigen values, Zero point energy, parity symmetric and anti-symmetric wave functions with graphical representation. (10)

Schrodinger's equation for a spherically symmetric potential, Rigid rotator, Schrödinger's equation for a one electron atom in spherical polar coordinates, separation of variables, orbital momentum and quantization, spherical harmonics, energy levels of Hatom, ground state and excited state wave functions, comparison with Bohr model.(5)

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Recommended Books:

1. University Fundamental Physics – Alonso and Finn vol. 1 Published by Addison-Wesley (1975)
2. Electricity and Magnetism- Berkeley Series: Vol. 2. E.M. Purcell
3. Feynman, Richard P, Robert B.Leighton, and Matthew L. sands Lectures on Physics. Vol: 3 Addison – Wesley 2 Edition.
4. Arthur Beiser, Concepts of Modern Physics by, Mc-craw Hill.
5. P.M. Mthew, K Venkatensan, A Text book of quantum –Mechanics: Tata Mc. Graw hill co.
6. G. Aruldhas, "Quantum-Mechanics" PHI hearing private ltd.

ATOMIC, MOLECULAR AND NUCLEAR SPECTROSCOPY

Course Code: ICT302   **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of spectroscopy which are the help in structure elucidation of chemical compounds.

Course Contents:
Module I: Ultra-violet and visible spectroscopy
Introduction, absorption law, instrumentation, theory of electronic spectroscopy, types of electronic transitions, concept of chromophore and auxochrome, types of absorption bands, Woodward-Fieser rule for calculating absorption maximum in unsaturated compounds, fluorescence and phosphorescence, applications of UV-violet spectroscopy.

Module II: Infra-red spectroscopy
Introduction, theory of molecular vibrations, number of fundamental vibrations, factors influencing vibrational frequencies, finger print region, application of IR spectroscopy in Hydrocarbons, unsaturated hydrocarbons, aromatic, halogen, alcohols and phenols, ethers, carbonyl compound for structure elucidation.

Module III: Nuclear magnetic resonance spectroscopy
Number of signals, instrumentation, chemical shift, shielding and deshielding effects peak area and proton counting, splitting of signals, spin-spin coupling, calculating the ratio in the heights of the signals, proton exchange reaction, coupling constant, C^{13}nmr spectroscopy, F^{19}nmr,application of NMR Spectroscopy.

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
1. Fundamentals of molecular chemistry – Colin N. Banwell
2. Spectrometric identification of organic compounds – R. M. Silverstein
3. Organic Spectroscopy – William Kemp, F.X. Webster

DEVELOPMENTAL BIOLOGY

Course Code: ICT303   **Credit Units: 04**

Course Objective:

Course Contents:
Module I: Developmental Biology of Plants
Vegetative Phase of Plant Development, Meristems, Shoot, Root apical meristems, Primary, Secondary, Auxillary, Intercalary, Floral and Inflorescence meristems, Leaf development, Arrangement of Leaf Primordia and their genetic programming, Root Development, Root tip developmental zones, Root apical meristems and Cell differentiation.

Module II: Developmental Biology of Plants
Structure of flower, Development of male gametophyte, Microsporangium, Anther wall, Sporogenous tissue, Development process, Megasporangium and development of female gametophyte, Pollination and fertilization, Endosperm, Embryo development in Monocotyledons and Dicotyledons, Embryogenesis and establishment of the essential features of the mature plant, Axial and radial patterning, Seed-structure and development.

Module III: Developmental Biology of Animals
Structure of the gametes: Sperm and The Egg, Fertilization, Gamete fusion: Fusion of the gametic material, Rearrangement of the egg cytoplasm, Early development, Cleavage: Definitions, Planes and Patterns, Blastulation and Morulation, Gastrulation: Definition, Morphogenic cell movements and significance

Module IV Developmental Biology of Animals
Regeneration: Limb and organ regeneration, Stem cells: Types and Applications, Animal cloning, Nuclear embryonic transfer techniques, Nuclear transfer technique, Embryonic clone and Teratology

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
1.Plant Physiology – Taiz & Zeiger 4th edition
2. The Plant Cell Journal Vol. 16, 2004 www.plantcell.org
3. Developmental Biology – Walpert
4. Embryology of Angiosperms – Bojwani & Bhatanagar
5. Developmental Biology - Veer Bala Rastogi, Vishal Publications Jalandhar

PROGRAMMING IN JAVA

Course Code: ICT304   **Credit Units: 04**

Course Objective:

The objective of the course is to give proficiency in developing multithreaded applications and applets in Java, in-depth knowledge of object oriented concepts, developing GUI applications in Java, creation of packages and applet programming.

Module I: Introduction to Java
Introduction to object oriented Programming: Basic concepts, benefits of OOPS, application of OOPS. Java evolution: history, features, c. c++ & Java a comparison. Java and www HW & SW requirements for Java, Structure of simple Java program. Java tokens, statements Java virtual machine, command line arguments, programming style, constants & variables, symbolic constants. Various operators in Java (arithmetic, relational, logical, assignment' increment, decrement, conditional, bitwise & special operator); arthritic expressions & there evaluation.

Module II: Introduction of Classes
Decision making and Branching: Decision making with if statement, if else statement, Nesting of if else statements. while statement, do statement and for statement. Jump in loops. Classes, objects and methods. Defining a class, object and methods. Defining a class, Adding variables and methods. Creating objects, accessing class members, Constructors, Method overloading, Static members, Nesting of methods, Inheritance, Extending a class, Overriding methods. Final variables and methods, Final classes. Finalize methods, Abstract methods and classes.

Module III: Introduction of Packages
Arrays and String: Arrays- one dimensional array, Creating an array, Two dimensional arrays, Strings and wrapper class. Defining interface, Multiple inheritance, Extending interfaces, Implementing interface, Accessing interface variable. Packages: Java API packages using system packages, Naming convention, Creating packages, Accessing a package, Using a package, Adding a class to a package, Hiding classes.

Module IV: Exception Handling and Multithreaded programming
Exception-Handling; Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Nested try Statements, Java's Built-in Exceptions.
Multithreaded programming; Creating threads, Extending the thread crass, Stopping and blocking a thread, Life cycle of a thread, Using thread method, Thread exceptions, Thread priorities, Implementing the runnable interface, Implementing with the thread class.

Module IV: Applet programming

Applet programming; Local and Remote applet, How applet differ from application, Preparing to write an applet, building applet code, applet life cycle, creating and executable applet. Designing a Web page, adding applet to HTML file, Running the applet. More about applet tag. Passing parameters to applets. HTML tags.

Examination Scheme:

Components	CT1	Q/HA.	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Herbert Schildt, "Java 2:The Complete Reference" , Fifth edition, Tata McGraw-Hill Education

References:

- E. Balaguruswamy, "Programming with JAVA- A primer", Tata McGraw-Hill Education Deitel & Deitel, "Java How to Program",
- Pearson Education Limited

DIFFERENTIAL EQUATIONS

Course Code: ICT305 **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with differential equations by order, linearity, and homogeneity, complex numbers, analytic function, complex integration, open mapping theorem and to get them familiar with various important applications in evaluating real integrals and model real-life applications using differential equations.

Course Contents:
Module I: Differential Equation
Differential equations of first order and first degree, variables separable, homogeneous equations. Linear equations and equations reducible to linear form. Exact differential equations and equations reducible to exact forms. Exact differential equations and equations which can be made exact. Linear Differential Equations with Constant Coefficients Complementary function, Particular Integral, General solution. Homogeneous linear Differential Equations with variable Coefficients.

Module II: Equations of the First order but not of first Degree
Equations solvable for y, x; Equations may be homogeneous in x and y, Equations may be of first degree in x and y (Clairaut's & Lagrange's forms)

Module III: Partial Differential Equations of The first order
Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method.

Module IV: Boundary Value Problems
Eigen values and Eigen functions problems, Strum-Liouville boundary value problem, solution of Laplace, Wave and Diffusion equations by separation of variables.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Recommended Books:
1. H. K. Das, Advanced Engineering Mathematics, S. Chand & Co.
2. J.L. Bansal and H.S. Dhami, Differential Equations, Vol. I & II Jaipur Pub. House, Jaipur.
3. Frank Ayres, Theory and Problems of Differential Equations. McGraw-Hill Book Co. 1972.
4. Erwin Kreyszig, Advanced Engineering Mathematics. John Wiley & Sons, New York, 1999.
5. E.A. Coddington, An Introduction to Ordinary Differential Equations. Prentice Hall of India Pvt. Ltd., New Delhi, 1968.
6. W.E. Boyce and P.C. Diprima, Elementary Differential Equations and Boundary Value Problems. John Wiley & Sons, New York, 1986.

INSTRUMENTATION IN BIOLOGY

Course Code: **ICT306**   **Credit Units: 03**

Course Objective:

The students will be exposed to techniques and instruments that are used in biotech industries.

Course Contents:

Module I: Electrophoresis

Agarose Gel Electrophoresis, SDS-PAGE, Isoelectric Focusing, Two-Dimensional Electrophoresis, Capillary Electrophoresis,

Module II: Chromatography

Adsorption Chromatography (Paper Chromatography, TLC), Molecular Exclusion Chromatography, Ion-Exchange Chromatography, Affinity Chromatography, HPLC and Gas Chromatography.

Module III: Spectroscopy

UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy, Nuclear Magnetic Resonance and Electron Spin Resonance spectroscopy,

Module IV Molecular Biology Technique

PCR, RT-PCR, Southern blotting, Western Blotting, Northern Blotting, Immunotechniques ELISA, Immunoelectrophoresis, Rocket Electrophoresis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- ➤ Wilson, K. and Walker, J. 2008. Principles and techniques of biochemistry and molecular biology. 6th Ed., Cambridge University press, New Delhi.
- ➤ Sawhney, S. K. and Singh, R. 2011. Introductory practical biochemistry, 2nd Ed., Narosa publishing house New Delhi.
- ➤ Upadhyay, A., Upadhyay, K. and Nath, N. 2010. *Biophysical Chemistry (Principles and Techniques).* Himalaya Publishing House Pvt. Ltd, Mumbai.

ATOMIC, MOLECULAR AND NUCLEAR SPECTROSCOPY LAB

Course Code: 321   **Credit Units: 1**

Exp. 1 To determine wave length of maximum absorption of solution of $KMnO_4$ using a spectrophotometer.

Exp. 2 Verify Beer's law and apply it to find the concentration of the given unknown solution.

Exp. 3 To determine the concentration of ferrous ions in a given sample spectrophotometrically by O-phenanthroline method.

Exp. 4 Determine the concentration of iron in the given sample of water by colorimetric method using KCNS as colour developing agent.

Exp. 5 Determination of reaction rate constant of acid catalyzed hydrolysis of ester.

Exp. 6 To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

Exp. 7 Compare the cleansing powers of two samples of a detergent.

Exp. 8 Determination of R_f value of amino acids by TLC and identify the amino acids present.

Examination Scheme:

Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment	Practical Record	Viva
15	10	05	35	15	10	10

DEVELOPMENTAL BIOLOGY LAB

Course Code :   **ICT322**   **Credit Units: 01**

Course Contents :

Module I
To determine the viability of pollen grains and seeds using tetrazolium salt (TTC) test
Study of germination of pollen tube from pollen grains using Brewbaker's medium

Module II
Microscopic slide preparation of pollen grain and ovule of angiosperms
 Study of different types of ovules and endosperms present in angiosperms

Module III
To study different stages of embryo development.

Module IV
Different stages in animal development with the observation of prepared slides

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

PROGRAMMING IN JAVA LAB

Course Code : ICT323   **Credit Units:** 01

1. Create a "Hello, World" program that simply prints out that statement.
2. Write a program that prints three arguments taken from the command line.
3. Write a program that prints values from 1 to 100.
4. Write a Java program to compute & print factorial of any given number.
5. Write a Java program to compute the sum of digits of a given integer.
6. Write a Java program to calculate & print first N Fibonacci numbers.
7. Write a Java Program to reverse the digits of a numbers.
8. Create a class with a default constructor (one that takes no arguments) that prints a message. Create an object of this class.
9. Design and write a Java program to define a class called Rectangle that contains members for representing its length and breadth. Provide members to get and set these attributes.
10. Design a class to represent a bank account. Include the following members:
    Data members:
    Name of the depositor
    Account number
    Type of account
    Balance amount in the account
    Methods:
    To assign initial values
    To deposit an amount
    To withdraw an amount after checking balance
    To display the name and balance
11. Write a simple program to call a method called simple from a main function. The method simple should accept an integer as an argument and calculate the square of the number in the method simple.
12. Write a Java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use method overloading to achieve this.
13. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MultDiv that extends from AddSub class to use the member data of the superclass. MultDiv should have methods to multiply and divide. A main method should access the method and perform the mathematical operations.
14. Write a Java Program to demonstrate use of Inheritance through vehicle, two wheeler, four wheeler and three-wheeler class.
15. Write a Java Program to demonstrate runtime polymorphism with the help of abstract classes.
16. Write a Java Program to demonstrate runtime polymorphism with the help of interfaces.
17. Write a java program to display the use of all access modifiers with the help of two packages
18. Write an interface with a method called display. Implement this method I a class to display two names.
19. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
20. Write a program to handle Null Pointer Exception and use the finally clause to display a message to the user.
21. Write a Java program to create 5 threads by extending Thread class.
22. Write a Java program to create 5 threads by implementing Runnable interface.

23. Write applets to draw the following shapes:
    (i) Cone
    (ii)Cylinder
    (iii)Cube
24. Write an applet to display a face.
25. Write an HTML program using different tags.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INSTRUMENTATION IN BIOLOGY LAB

Course Code : ICT 324   **Credit Units: 01**

Course Contents :

Module I
Agarose Gel electrophoresis,
SDS-PAGE

Module II
Chromatography –Paper Chromatography and Thin Layer Chromatography

Module III
Spectrophotometer techniques

Module IV
PCR,
ELISA
Immunoelectrophoresis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

COMMUNICATION SKILLS - I

Course Code: BCS 301   **Credit Units: 01**

Course Objective:

To form written communication strategies necessary in the workplace.

Course Contents:

Module I: Introduction to Writing Skills

Effective Writing Skills

Avoiding Common Errors

Paragraph Writing

Note Taking

Writing Assignments

Module II: Letter Writing

Types

Formats

Module III

Memo

Agenda and Minutes

Notice and Circulars

Module IV: Report Writing

Purpose and Scope of a Report

Fundamental Principles of Report Writing

Project Report Writing

Summer Internship Reports

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Business Communication, Raman –Prakash, Oxford

- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

UNDERSTANDING SELF FOR EFFECTIVENESS - III
(INTERPERSONAL COMMUNICATION)

Course Code: BSS305   **Credit Units: 01**

Course Objective:

This course provides practical guidance on:

Enhancing personal effectiveness and performance through effective interpersonal communication

Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction

Importance of Interpersonal Communication

Types – Self and Other Oriented

Rapport Building – NLP, Communication Mode

Steps to improve Interpersonal Communication

Module II: Behavioural Communication

Meaning and Nature of behavioiural communication

Persuasion, Influence, Listening and Questioning

Guidelines for developing Human Communication skills

Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles

Transactional Analysis

Life Position/Script Analysis

Games Analysis

Interactional and Transactional Styles

Module IV: Conflict Management

Meaning and nature of conflicts

Styles and techniques of conflict management

Conflict management and interpersonal communication

Module V: Negotiation Skills

Meaning and Negotiation approaches (Traditional and Contemporary)

Process and strategies of negotiations

Negotiation and interpersonal communication

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - III

Course Code: FLT 301   **Credit Units: 02**

Course Objective:

- To provide the students with the know-how

- To master the current social communication skills in oral and   in written.

- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical: **Unité 6: se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer

2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant

3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

1. maîtriser les actes de la communication sociale courante

(Salutations, présentations, invitations, remerciements)

2. annoncer un événement, exprimer un souhait, remercier,

s'excuser par écrit.

3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs

2. articles partitifs

3. Négations avec de, ne…rien/personne/plus

4. Questions avec combien, quel…

5. expressions de la quantité

6. ne…plus/toujours - encore

7. pronoms compléments directs et indirects

8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct

9. Impératif avec un pronom complément direct ou indirect

10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - III

Course Code: FLG 301   **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Modal verbs

Modal verbs with conjugations and usage

Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)

Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case

Dative case, comparison with accusative case

Dative case with the relevant articles

Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns

Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions

Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues

In the Restaurant,

At the Tourist Information Office,

A tlelphone conversation

Module VII: Directions

Names of the directions

Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions

To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

Course Code: FLS 301   **Credit Units: 02**

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I

Revision of earlier semester modules

Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*

Weather

Module II

Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III

Translation of Spanish-English; English-Spanish. Practice sentences.

How to ask for directions (using estar)

Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV

Simple conversation with help of texts and vocabulary

En el restaurante

En el instituto

En el aeropuerto

Module V

Reflexives

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

CHINESE – III

Course Code: FLC 301   **Credit Units: 02**

Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between "hii" and "neng", "keyi".

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g. ; fever, cold, stomach ache, head ache.
Use of the modal particle "le"
Making a telephone call
Use of "jiu" and "cal" (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.

Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV

The ordinal number "di"

"Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.

use of to enter to exit

Structural particle "de" (Compliment of degree).

Going to the Park.

Description about class schedule during a week in school.

Grammar use of "li" and "cong".

Comprehension reading followed by questions.

Module V

Persuasion-Please don't smoke.

Please speak slowly

Praise – This pictorial is very beautiful

Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.

Talking about studies and classmates

Use of "it doesn't matter"

Enquiring about a student, description about study method.

Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

Statistical and Solid state Physics

Course Code: ICT 401   **Credit Units: 03**

Course objectives:

To understand the basic principles of statistical and solid state physics. These principles and their application to physics are presented in this course.

Course Contents:

Basic Principles, Canonical and Grand Canonical ensembles:

Concept of statistical distribution, phase space, density of states Liouville's theorem, systems and ensemble, entropy in statistical mechanics Connection between thermodynamic and statistical quantities, micro canonical ensemble, equation of state, specific heat and entropy of a perfect gas, using micro canonical ensemble.   (7)

Canonical ensemble, thermodynamic functions for the canonical ensemble, calculation of means values, energy fluctuation in a gas, grand canonical ensemble, thermodynamic functions for the grand canonical ensemble, density fluctuations.   (6)

Partition functions and Statistics: Partition functions and properties, partition function for an ideal gas and calculation of thermodynamic quantities, Gibbs Paradox, validity of classical approximation, determination of translational, rotational and vibration contributions to the partition function of an ideal diatomic gas. Specific heat of a diatomic gas, ortho and para hydrogen.   (10)

Identical particles and symmetry requirement, difficulties with Maxwell- Boltzmann statistics, quantum distribution functions, Bose Einstein and Fermi- Dirac statistics and Planck's formula, Bose Einstein condensation, liquid He_4 as a Boson system.   (7)

Statistical mechanism of solid: Fermi-Dirac distribution function, density of states, temperature dependence of Fermi energy, specific heat, use of Fermi-Dirac statistics in the calculation of thermal conductivity and electrical conduction band, Drude theory of light, absorption in metals.   (7)

Band Theory: Block theorem, Kronig Penny model, effective mass of electrons, Wigner-Seitz approximation, NFE model, tight binding method and calculation of density for a band in simple cubic lattice.   (5)

Recommended Books:
1. Huag: Statistical Mechanics.2nd ed wiley,1987
2. Reif: Fundamentals of Statistical and Thermal Physics, Mcgrawhill
3. Kittle: Elementary statistical mechanics.
4. Palteros: Solid State Physics.
5. Levy: Solid State Physics.

Quantum Chemistry

Course Code: ICT 402   **Credit Units: 03**

Course objectives:

The understanding of chemical phenomena at the microscopic level requires a knowledge of the principles of quantum mechanics. These principles and their application to chemistry are presented in this course.

Course Contents:

Module I: Introduction to Exact Quantum Mechanical Results

Introduction to Schrodinger, Equation and the postulates of Quantum Mechanics. Discussion of solutions of the Schrodinger Equation to some model systems viz. particle in a box , the harmonic oscillator, The rigid rotor, the hydrogen atom, including shapes of atomic orbital's; orbital and spin angular momenta; tunneling**.**

Module II: Approximate Methods

The Variation Theorem, operator algebra Linear vibration Principle, Perturbation Theory (First order and non-degenerate). Application of variation method and perturbation, theory of helium atom.

Module III: MOT

Huckels Theory of conjugated system, bond order and charge density calculation, Application to ethylene, Butadiene, Cyclopropenyl radical, cyclobutadiene etc. Introduction to extended Huckel Theory.

Recommended Books:

1.   J. P. Lowe and K.Peterson, Quantum Chemistry Academic Press.
2.   D. A. McQuarrie, Quantum Chemistry Viva Books Pvt. Ltd.: New Delhi.
3.   R. G. Mortimer, Mathematics for Physical Chemistry Elsevier.
4.   F. L. Pilar, Elementary Quantum Chemistry, Dover Publication Inc.: New York.
5.   P. W. Atkins and J. de Paula, Atkin′s Physical Chemistry, Oxford University Press.
6.   I. L. Levine, Quantum Chemistry, Prentice-Hall Inc., New Jersey.

Fundamentals of Bioinformatics

Course Code: ICT 403   **Credit Units: 03**

Course Objective:

The objective is to describe data models and database management systems with an emphasis on biologically important techniques to store various data on DNA sequencing structures, genetic mapping, phylogenetic analysis. Multiple sequence alignment, protein structure prediction, and comparative genome analysis.

Course Contents:

Module I

Basics of Genomics: Genome Sequencing Methods, (Sanger Sequencing, Maxum Gilbert methods) Next generation Sequencing techniques.

Web resources for genomics data storage.The NCBI, sequence databases, sequence retrieval, sequence file formats, submitting DNA, protein sequences and sequence assembly.

Module II

Exact string matching -classical comparison-based methods, semi numerical string matching, suffix trees -construction and application, Databases and rapid sequence analysis –BLAST and FASTA, sequence comparison by statistical content; Dynamic programming alignment -The number of alignments, shortest and longest paths in a network, global distance and similarity alignments, Fitting one sequence onto the other, trace backs, parametric sequence comparison

Module III

Global and local alignments, scoring matrices-PAM and BLOSUM and gap penalties, filtering, position specific scoring matrices, internet resources, uses of multiple sequence alignment programs and methods pattern searching programs, family and superfamily representation & profit analysis.

Module IV

Trees-representation of sequences, tree interpretation, Distance – additive, ultrameric and nonadditive distances, tree building methods, phylogenetic analysis, parsimony, Bootstrap, maximum likelihood trees, estimating the rate of change, likelihood and trees; analysis software.

Module V

Annotation, ESTs – databases, comparative genome analysis clustering, gene discovery, protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification; Structure databases– PDB and MMDB, visualizing structural information.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Essentials of Genomics and Bioinformaticsby C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount, Cold Spring Harbor Laboratory Press.
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and B.F.F Ouellette, Wiley – interscience.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield, Cambridge University Press
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. Von Heijne and G. Von Heijne, Academic Press.
- Computational Molecular Biology: An Algorithmic Approach by P.A. Pevzner, MIT Press
- Computer Methods for Macromolecular Sequence Analysis by R.F. Doolittle, J.N, Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Computational Biology: Maps, Sequences and Genomes by M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. V. Heijne and G.V. Heijne, Academic Press.

Database management System

Course Code: ICT 404   **Credit Units: 03**

Course Objective:

The objective of this course is to expose the students to the fundamentals & basic concepts in Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains   techniques for database design, Normalization and database Query.

Course Contents:

Module I: Introduction to DBMS

Definition of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances.

Module II: Relational Database & ER Model

Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Entity, Types of Entity, Weak Entity Attributes, Entity sets, Entity – Relationship Diagrams. Degree and Cardinality, Specialization, Generalization, Aggregation. Reduction of an E-R Schema to Tables.

Module III: Relational Model Objects

Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules; Relational operators, Referential Integrity Constraints, Relational Algebra, Relational Calculus.

Module IV: Database Design

Definition Of Functional Dependencies, Process Of Normalization, First Normal Form, Second Normal Form, Third Normal Form. Boycee Codd Normal Form, Fourth Normal Form, Fifth Normal Form.

Module V: Structured Query Language and PL/SQL

Objects in RDBMS , SQL Components (DDL, DML, DCL), SQL Data Definition and Data Types, Specifying Basic constraints in SQL, Schema change statement (Alter, Drop) Basic queries in SQL (Select…from…where…. group by…. having…. order by…), More complex queries in SQL (Joins, Sub-queries, Correlated query), DML (Insert, Update, Delete, Merge), Transaction Control Language (TCL), Data Control Language (DCL), Views. Introduction and Structure of PL/SQL program, Control Statements, Stored Procedure, and triggers.

Text

- Elmasari, Navathe, "Fundamentals of Database Systems", Addision Wesley.
- Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.
- Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
- Date C J." An Introduction to Database Systems", Addision Wesley.

References:
- Introduction to Database Systems, Bipin C Desai, Galgotia
- Oracle 9i The Complete Reference, Oracle Press

Statistical methods

Course Code: ICT 405   **Credit Units: 03**

Course Objective:

The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I

Statistics and Biostatistics: Preliminary concepts. Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Standard deviation, Variance

Module II
Probability: Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Continuous Distribution
Normal Distribution, Properties of Normal distribution

Module IV: Correlation
Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module V: Regression
Definition, Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module VI: Introduction to the following Statistical terms
Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications. Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test. Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means. Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity. Analysis of Variance: One way and Two way (only Examples).

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

Workshop Practice

Course Code: ICT 406   **Credit Units: 03**

Course Objective:

After learning the course the students should be able to understand applications of hand tools and power tools. Understand the operations of machine tools. Select the appropriate tools required for specific operation. Comprehend the safety measures required to be taken while using the tools.

MODULE –I Casting Processes:
Principles of metal casting: Pattern materials, types and allowance; Study of moulding, sand moulding, tools, moulding materials, classification of moulds, core, elements of gating system, casting defects, e.g. die-casting, permanent mould casting.

MODULE –II Smithy and Forging:
Basic operation e.g. upsetting, flattening, drawing, drop forging, press forging

Bench Work and Fitting
Fitting, sawing, chipping, thread cutting (die), tapping; Study of hand tools, Marking and marking tools.

MODULE –III Metal joining:
Welding principles, classification of welding techniques; Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Flux: composition, properties and function; Electrodes, Brazing and soldering.

MODULE –IV Sheet Metal Work:
Introduction of tools and equipment; metals used for sheets, standard specification for sheets, spinning, bending, embossing and coining.

Project work-I: Preparation of a real life job using the processes practiced in Workshop practice.

Text Books:
   1.   Manufacturing Process by Raghuvanshi, Publisher: New Age International
   2.   Manufacturing Technology by P.N.Rao, Publisher : TMH publications

 Reference Books:
   1.   Workshop Technology by Hazra-Chowdhary
   2.   Production Engineering by R.K.Jain
   3.   Workshop Technology by Chapman

MICROBIOLOGY

Course Code: ICT 407   **Credit Unit:03**

Course Objective:
An introduction to microorganisms, their morphology, reproduction, cultivation, metabolism, genetics, ecology of microorganisms and their relationships to health and environment

Course Contents:

Module I
Introduction (bacteria, fungi, algae, protozoa and viruses), Contribution of Scientists, Koch's Postulates, methods in Microbiology -Principles of microbial nutrition, Culture media, Theory and practice of sterilization, pure culture techniques, Enrichment culture techniques and Microbial lab techniques.

Module II
Prokaryotic structure and function - Microbial nutrition and growth - Arithmatic and Geomatric Growth expression, mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, continuous culture, Diauxic growth, culture collection and maintenance of cultures.

Module III
Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual, ribosomal RNA sequencing, microbial regulation of gene expression (attenuation and negative regulation with e.g. *trp* and *lac* operon), transfer of genetic material: plasmids, transposons, transduction, transformation and conjugation .

Module IV
Host-parasite relationship -Normal micro flora of skin, oral cavity, gastrointestinal tract; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Plant -Microbe Interactions, Microbial pathogenesis -Disease reservoirs; Epidemiological terminologies; Infectious disease transmission

Module V
Chemotherapy/antibiotics -Antimicrobial agents, sulfa drugs, antibiotics -penicillin and cephalosporins, broad spectrum antibiotics, antibiotics from prokaryotes. antifungal antibiotics; mode of action, resistance to antibiotics

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Pelczar, M.J., Chan, E.C.S. & Kreig, N.R. (2001). Microbiology 6th Ed. Tata McGraw Hill.
- Prescott, L.M. (2014). Microbiology, 9th Ed. McGraw by Hill Higher Education.

References:
- Stanier, R.Y., Ingraham, J.L., Wheelis M.L. & Painter, P.R. (2005). General Microbiology, 5th Ed. McMillan,
- Atlas, R.M. (1997). Principles of Microbiology 2nd Ed. WMT Brown Publishers.
- VanDemark, P.J. & Batzing, B.L. Menlo Park (1987). *The microbes: an introduction to their nature and importance,* Benjamin/Cummings Publishing Co.
- Tortora, G. J., Funke, B. R. and Case, C.L. (1994).Microbiology 5th Ed. Benzamin Cummings Inc. California.

Fundamentals of Bioinformatics Lab

Course Code: ICT 421   **Credit Units: 01**

Course Objective:

To demonstrate the techniques and soft wares used for sequence analysis, alignment, structure prediction of the proteins and other compounds and finding the phylogenetic relationships

Course Contents:

Module I

Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein

Module II

Local and Global Alignment- concepts Pair wise sequence alignment, multiple sequence alignment

Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm

Module III

Motif and pattern searching, Structure prediction, Protein structure classification resources, Structure

superposition tools, Energy minimization and simulated annealing

Module IV

Phylogenetic prediction and analysis

Module V

Docking small molecules/peptides in active site of protein. Use of automated docking procedures. Free energy calculation.

Module VI

Finding transcription regulatory signals

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Database management System Lab

Course Code: ICT 422 **Credit Units: 01**

Course Contents:

Module I

Database creation using DDL and DML.

Module II

Defining the primary and secondary keys.

Module III

Implementation of selection, projection and joins (internal and external) with SQL and Perl.

Module IV

Normalization of databases with SQL and Perl

Module V

Implementation of transactions and schedules.

Module VI

Detection of association rules and knowledge recovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Microbiology Lab

Course Code: ICT 423   **Credit Units: 02**

Course Contents:

Module I

Preparation of culture media for cultivation of specific microorganism. Isolation of microbes from air, soil and water samples, their identification by staining techniques – simple staining, differential Gram staining, lacto phenol cotton blue staining for fungi

Module II

Biochemical test – Indole test, methyl red test, voges proskaeur test, citrate utilization, starch hydrolysis, protease, catalase test and oxidase test. Identification of microbes in water samples; standard plate count, presumptive and confirmed coli form test, BOD and COD

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

COMMUNICATION SKILLS - II

Course Code : BCS 401   **Credit Units: 01**

Course Objective:

To teach the participants strategies for improving academic reading and writing.

Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Social Communication Skills

Small Talk

Conversational English

Appropriateness

Building rapport

Module II: Context Based Speaking

In general situations

In specific professional situations

Discussion and associated vocabulary

Simulations/Role Play

Module III: Professional Skills

Presentations

Negotiations

Meetings

Telephony Skills

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman –Prakash, Oxford

UNDERSTANDING SELF FOR EFFECTIVENESS - IV
(RELATIONSHIP MANAGEMENT)

Course Code : BSS405   **Credit Units: 01**

Course Objective:

To understand the basis of interpersonal relationship.

To understand various communication style.

To learn the strategies for effective interpersonal relationship.

Course Contents:

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management

Impression Management Techniques (Influencing Skills)

Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - IV

Course Code: FLT 401   **Credit Units: 02**

Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

Course Contents:

Module C: pp. 104 – 139: Unités 8, 9

Contenu lexical: Unité 8: Découvrir le passé

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite
   d'événements/préciser leur date et leur durée.

3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin,
   préciser les étapes d'une réalisation)

2. parler d'une entreprise
3. parler du futur

Contenu grammatical: 1. Imparfait

2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

Examination Scheme:

Components	CT1	CT2	C	I	V	A

Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - IV

Course Code: FLG 401   **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.

Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

Module I: Present perfect tense

Present perfect tense, usage and applicability

Usage of this tense to indicate near past

Universal applicability of this tense in German

Module II: Letter writing

To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions

Usage of prepositions with both accusative and dative cases

Usage of verbs fixed with prepositions

Emphasizing on the action and position factor

Module IV: Past tense

Introduction to simple past tense

Learning the verb forms in past tense

Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale

Comprehension and narration

- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module VII: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - IV

Course Code: FLS 401   **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I

Revision of earlier semester modules

Introduction to Present Continuous Tense (Gerunds)

Module II

Translation with Present Continuous Tense

Introduction to Gustar, Parecer, Apetecer, doler

Module III

Imperatives (positive and negative commands of regular verbs)

Module IV

Commercial/business vocabulary

Module V

Simple conversation with help of texts and vocabulary

En la recepcion del hotel

En el restaurante

En la agencia de viajes

En la tienda/supermercado

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

CHINESE – IV

Course Code: FLC 401   **Credit Units: 02**

Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Dialogue Practice

Observe picture and answer the question

Pronunciation and intonation

Character writing and stroke order.

Electronic items

Module II

Traveling – The Scenery is very beautiful

Weather and climate

Grammar question with – "bu shi …. Ma?"

The construction "yao … le" (Used to indicate that an action is going to take place)

Time words "yiqian", "yiwai" (Before and after).

The adverb "geng".

Module III

Going to a friend house for a visit meeting his family and talking about their customs.

Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.

Aspect particle "guo" shows that an action has happened some time in the past.

Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.

To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV

Shipment. Is this the place to checking luggage?

Basic dialogue on – Where do u work?

Basic dialogue on – This is my address

Basic dialogue on – I understand Chinese

Basic dialogue on – What job do u do?

Basic dialogue on – What time is it now?

Module V

Basic dialogue on – What day (date) is it today?

Basic dialogue on – What is the weather like here.

Basic dialogue on – Do u like Chinese food?

Basic dialogue on – I am planning to go to China.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

ADVANCED GENETIC ENGINEERING

Course Code: ICT501   **Credit Units: 03**

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes implication can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Module I: Basic introduction, tools and specialized enzymes:
Basic Introduction, Host controlled restriction modification system (Nomenclature, Type I-IV restriction endonucleases, Isoschizomers); DNA Methyltransferases; DNA polymerases; Special case of thermo-stable DNA polymerases in context to PCR. (History, concept, enzymology, and applications).

Module II: Cloning vectors:
Plasmids based vectors; Lambda based vectors and derivatives (Insertion vectors, replacement vectors, cosmids, Specialized cloning vectors (e.g. TOPO, TA cloning).

Module III: DNA Libraries:
Isolation and purification of nucleic acid (genomic/plasmid DNA and RNA), DNA libraries;Construction of cDNA library, Construction of Genomic library, Screening and preservation of DNA libraries. Expression libraries: Screening of expression libraries.

Module IV: Heterologous gene expression (bacteria and yeast):
Expression vectors: Structure and function, Advances in engineering of genes (codon optimization, translational enhancers, mRNA stabilizing factors), vectors (targeting signals, selection markers, purification and solubility tags) and hosts for overexpression and analysis.

Module V: Automation and robotic advances in genetic engineering
DNA sequencing - Sanger method of DNA sequencing (Manual and automated), Maxam Gilbert method. Example from Human Genome Project and other sequencing projects, PCR machines, imaging and gel documentation system.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Recombinant DNA by J.D. Watson et al., W.H. Freeman and Company
- Recombinant DNA Technology by T. A. Brown
- Principles of Gene Manipulation: An Introduction to Genetic Engineering by R.W. Old and S. B Primrose, Blackwell Science Inc

References:
- Molecular Biotechnology: Principles and Applications of Recombinant DNA by B.R. Grick and J.J. Pasternak, ASM Press
- Molecular and Cellular Cells Methods in Biology and Medicine by P.B. Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- "Milestones in Biotechnology: Classic Papers on Genetic Engineering" by J.A. Bavies and W.S.
- Reznikoff, Butterworth Heinemann.

FUNDAMENTALS OF NANOSCICE AND NANOTECHNOLOGY

Course Code: ICT502   **Credit Units: 03**

Course objective: Nanotechnology is one of the most important and influential fields in today's scenario. It holds tremendous potential and has shown significant impact on both basic and applied sciences. The major objective of this course is to introduce this contemporary area to the students.

Module-I
Introduction: History- The purple of Cassius, the Lycurgus cup,Michael Faraday and "divided metals", Richard Feynman,His theory and predictions, Moore's Law, Miniaturization of microprocessors. , the story of the Damascus sword. What is "nano'? Comparison with familiar objects. From nanoscience to nanotechnology: Eric Drexler.

Module-II
Nanoscience: The multidisciplinary science, Bottom-up and top-down approach of research with examples, Different types of Nanomaterials, one-dimensional: CNTs, its types and characteristics;Two-dimensional:Nanofilms, nanosheets, nanowalls.

Module-III
Properties of Nanomaterials, Different types of Nanomaterials and their Size, Quantum effects. Seeing Nanomaterials: Microscopes(SEM, TEM,STM, AFM)How do the different types of microscope work with Nanomaterials. Preparation of Nanomaterials: Physical Method (hydrothermal and solvothermal)Chemical methods, Biological methods (Green synthesis using plants, microbes & other living organisms).

Module-IV
Nanobiotechnology: Nanomedicine, Nanocosmetics, Textiles, Nanosensors ((biological,chemical,Biosensors,Gas sensors, mechanical), Drug delivery,Cancer therapy,Tissue engineering, water purification, Lab-on-a-chip (LOC),nanocomputers,DNA computer,MRI with magnetic nanoparticles. Current trends of research in Nanobiotechnology, particularly health sciences.

Module-V
Dosage-dependent effects (stimulatory or inhibitory) of different synthetic nanomaterials (gold, silver and variants of carbon nanotubes) on morphophysiological and molecular responses of the plants. **Acquistion of** nanomaterials by roots, intracellular localization and their mobilization to aerial parts. **Effects of** nanomaterials on homeostasis of essential macro-and micro elements. **Nanofertlizers**, nanoherbicides and nanopesticides. **Omic technologies** for deciphering nanomaterials-mediated responses of the plants. **Toxicity, environmental** implications of nanomaterials and safety issues. **Current trends** and future perspective of Nanobiotechnology for enhancing growth and development and/or yield potential of crop species for sustainable agriculture. **Potential** applications of Nanobiotechnology for alleviating biotic and/or abiotic stress responses of the crop species for sustainable agriculture.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Suggested Readings:

- Manasi Karkare.Nanotechnology: Fundamentals and Applications.2008. I.K. International K. Eric Drexler ,Chris Peterson and Gayle Pergamit.Unbounding the future: The Nanotechnology Revolution. 1991.William Morrow and Company, Inc., New York.

- C N R Rao.Nanoworld: An Introduction to nanoscience and Technology.2010. Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore.

- Manzer H.Siddiqui, M.H.Al –Whabhi, F. Mohammad (Editors).Nanotechnology and Plant Sciences.2015.Springer.

- C.M. Niemeyer and C.A. Mirkin .Nanobiotechnology . 2012. Wiley-VCH

- C.M. Niemeyer and C.A. Mirkin .Nanobiotechnology-II . 2012. Wiley-VCH

- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiley 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christof M. Niemeyer, Wiley 2007, ISBN: 978-3-527-31673-1.
- Nano: The essentials - Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7 / 0071548297.

FUNDAMENTALS OF INFORMATION AND COMMUNICATION

Course Code: ICT503   **Credit Units: 03**
Course Objective:
The objective of this course is to acquaint the students with the basic of Information and Communication. This course covers basic underlying concepts and techniques used most recently. This course will help the students to learn various communication techniques. They will learn about traditional communication structure, its modulation, multiplexing and other important parameters. They will also learn significance of various network topologies, hardware and protocols deployed at each OSI and TCP/IP model layer.

Course Contents:

Module I: Introduction to Information Technology
Basic Concept of Information Technology, Data Processing: Data & Information, Types of Computer, Block Diagram of Computer, Von-Neumann Architecture, Computer Hardware V/s Software, Data Representation, Binary, Decimal, Octal, Hexadecimal Representation and their inter conversions, Information Technology Applications: Home, Education, Science & Medicine, Engineering and Entertainment.
Module II: Introduction to Communication Technology
Basic concept of Communication and their components, Communication Representation and types of communication flow.
Basic Network Components, Types of connections, Topology and their types, Network Types.
Internet History, Electronic Mail, FTP, SMTP, POP.
Module III: Network Models
TCP/IP: Protocols, Layers and their applications, addressing scheme of TCP/IP, OSI: Layers and their applications.
Module IV: Communication Signals and their transmissions
Analog and Digital Signals, Components: Sine Wave, Phase, Wavelength, Time V/S Frequency, and Bandwidth.
Transmission Impairment, Performance Measurement, Transmission Modes.
Transmission Conversion: Digital to Digital, Analog to Digital, Digital to Analog and Analog to Analog.
Module V: Transmission Media and Switching Techniques
Types of Media: Guided and Unguided. Packet switching V/S Circuit switching Network, Error Detection and Correction.
Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Raja Raman V., "Fundamental of Computers", Prentice Hall of India, New Delhi.
- Computer Networks by Andrew S. Tanenbaum, PHI.

*References***:**
- Data Communication & Networking, by Behrouz A. Forouzan, 4th Edition.
- Data & Computer Communications by William Stallings, PHI, 10th Edition.

FUNDAMENTALS OF COGNITIVE AND NEUROSCINCE

Course Code: ICT504   **Credit Units: 03**

Course Objective: The objective of this course is to acquaint the students with the basics of cognitive and neuroscience. This course covers basic underlying concepts and techniques used most recently. This course will help the students to learn various approaches of cognitive and neuroscience.

1. **Cognitive Science**: Introduction, defining Cognition, Historical and Futuristic perspectives. **(2)**

2. **Interdisciplinary relevance**: with psychology, philosophy, neuroscience, linguistics, anthropology, Computer Science, sociology and biology. **(3)**

3. **Exploring Mind:** Multiple approaches. The Representational theory of mind and theories of Mental Representation. **(4)**

4. **Approaches to Cognitive science:** Logic, Rules, Concepts, Analogies, Images, Connections. **(6)**

5. **Cognitive Development:** Life span development, Piagetion Perspective, Core knowledge perspective, Vygotskion Perspective, Information processing perspective. **(5)**

6. **Extensions to Cognitive Science I: (a)** Perception (b) Attention (c) Pattern recognition (d) Consciousness **(7)**

7. **Extensions to Cognitive Science II: (a)** Memory (b) Representation of Knowledge (c) Language (d) Mental Imagery **(7)**

8. **Extensions to Cognitive Science III: (a)** Thinking (b) Problem Solving (c) Creativity (d) Human Intelligence (e) Artificial Intelligence **(7)**

9. **Cognitive Science and Societal Dynamics (2)**

10. **Research Methods in Cognitive Science (2)**

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	**15**	**5**	**10**	**70**

Recommended Books:

1. Thagard P. (2005) Mind: Introduction to Cognitive Science. MIT Press.

2. Kolak, D.et.al (2006) Cognitive Science: an introduction to Mind and brain

3. Solso R.L. (2001) Cognitive Psychology Delhi: Pearson Education.

4. Berk, L.E. (2003) Child development Delhi: Pearson Education

5. Matlin, M.W. (2002). Cognition, USA, Wadsworth, Thomson Learning.

FUNDAMENTALS OF ENVIROMENTAL SCIENCE AND TECHNOLOGY

Course Code: ICT 505   **L:4,T:0, P:0, C:4**

Course Objectives:

The primary objective of this course is to provide students with the essential fundamentals and foundation of environmental science various technologies. It emphasizes on understanding and knowledge about the growing evidence of local and global pollution to limit human impact on the environment.

Course Contents:
MODULE I: ENVIRONMENTAL POLLUTION & CONTROL
Air Pollution –Concept of air pollution. Classify different types of air pollutants, sources, effects, behavior,sink & control of air pollutants – CO, NOx, HC, SOx, ozone and particulates.
Effect of pollutants on human & environment: photochemical smog, acid rain, ozone depletion.
Water Pollution – Classification of Pollutants, types, sources, water quality parameters such as color, conductivity,turbidity, total solids,hardness, alkanity,chlorine, fluoride, nitrate, phosphate, DO, BOD, COD, oil and grease, phenol, heavy metals, pesticides, and microbes.Technologies for Treatment of industrial effluents with special focus on use of biological methods. Basic concept and design principles of various wastewater treatment units Advanced waste water treatment techniques.
Soil Pollution – Composition of soil, soil formation processes, soil profile, soil properties, classification. Soil pollution due to release of wastewater, storage and dumping of solid and hazardous wastes, application of fertilizers and pesticides etc. Solid erosion control and soil pollution control techniques.
Solid Waste Pollution –Types of solid Waste –agricultural waste, municipal waste, biomedical waste, industrial waste, e-waste waste treatment and disposal methods open dumping, thermal processes such as incineration, compositing, sanitary land filling etc. Solid waste management strategies such asreduce, reuse remanufacture. recycle and repair, methods, recovering energy from wastes
Hazardous wastes – Classification, radioactive, biomedical & chemical, treatment and disposal – Physical, chemical and biological processes.
Marine Pollution – Causes, effects and control of marine pollution, coastal zone management.
MODULE II: CHEMICAL TOXICOLOGY
Toxic chemicals in the environment, impact of toxic chemicals on enzymes, health impact of toxic chemicals.Toxicity of metals such as arsenic, cadmium,lead, chromium, mercury, selenium, berylliumToxicity of inorganic compounds such as oxides of nitrogen, sulphur dioxide, ozone, asbestos and pesticides
MODULE III: ECO-FRIENDLY POLYMERS
Polymer synthesis, Environmental degradation of polymers Photodegradable polymers, hydrolysis and hydro-biodegradable polymers. Biopolymers and bioplastics, thermal degradation of plastics during recycling.
MODULE IV: GREEN TECHNOLOGY
Introduction to concept of green technology, Basic principles of green technology such as minimization of environmental degradation, zero greenhouse gas emissions, zero waste generation,conservation of water resources, conservation of natural resources,conservation of energy and usage of renewable sources (solar, wind, etc). Concept of Atom economy, Tools of Green technology such asdevelopment of alternative fuels, green buildings, design and application of chemical products and processes to eliminate hazardous waste generation, reuse of waste water etc.
MODULE V: ENVIRONMENTAL BIOTECHNOLOGY
Bioaccumulation, biodegradation, Bioremediation, bioleaching, Biomethanation.
MODULE VI: ENVIRONMENTAL LAWS
Environmental Legislation- Historical overview, National and International conventions and treaties.Environmental Acts and Rules-Important Acts and rules such as Water Prevention and Control of Pollution Act, 1974, Water Cess Act 1977 and the Rules under the Act, The Air (Prevention &Control of Pollution Act , 1981 and the corresponding Rules . The Environment (Protection Act, 1986) and the concerned Rules, Forest and Wildlife Acts such as Biodiversity Conservation Act and the rules there under and other such Acts and the concerned rules.

MODULE VII: ENVIRONMENTAL IMPACT ASSESSMENT

Concept of Environmental Impact Assessment (EIA), MOEF guidelines for conducting EIA, basic steps for overall evaluation and environmental clearance. Scoping: Scoping techniques used in EIA, listing and prioritizing significant issues. Baseline Data Generation: Scoping of suitable sampling sites, detailed methodology of baseline data collection for air, water, noise, biodiversity and socio-economic environmental components. Data analysis.Impact Assessment: Using mathematical models for evaluation of impacts of different environmental constituents such as air, water and noise Environmental Management Plan: Basic concept of EMP, preparation of EMP and its implementation such as development of green belt.

MODULE VIII: ENVIRONMENTAL MANAGEMENT SYSTEMS

Concept of environment Management system (EMS), evolution of environment management system, Plan-Do-Check-Act cycle

ISO 14001 Standards: Environmental Policy, Environmental management planning, implementation and operation, Monitoring and Measurement, Management Review

*Environmental Auditing:*Concept, Steps involved in auditing, types of audit, conducting audit, corrective actions taken by industries.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text books &References:

1. Ecology and Environment- P.D. Sharma
2. Ecology of Natural resources –Ramade
3. Fundamentals of Ecology: E. P. Odum
4. Modern concepts in Ecology: H. D. Kumar
5. Heinsohn, R.J., Kabel, R.L., Sources and Control of Air Pollution, Prentice-Hall, 1999.(Chapter 9. Atmospheric Dispersion)
6. Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2004). At Risk 2nd Edition: Natural Hazards, People's Vulnerability and Disasters. Routledge.
7. Uberoi N.K. (2002)."Environmental Management", New Delhi, Excel Books.

ADVANCED GENETIC ENGINEERING LAB

Course Code: **ICT 521**   **Crédit Unit: 01**

Course Contents:

1. Isolation of Bacterial genomic DNA

2. Primer designing and amplification of gene of interest using polymerase chain reaction

3. Purification of the amplified DNA by column purification

4. Ligation

5. Restriction digestion

6. Preparation of competent cells using $CaCl_2$ method.

7. Transformation of DNA using $CaCl_2$ based heat shock method.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Atten dance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

FUNDAMENTALS OF NANOSCENCE AND NANOTECHNOLOGY – LAB

Course Code: ICT 522   **Crédit Unit: 01**

Course Contents:

1. OHS in nanotechnology.

2. Chemicals preparation, handling (aqua regia) and role in washing glass-wares for metal nanoparticles synthesis.

3. Green synthesis of gold and silver nanoparticles.

4. Demonstration of SPRproperties of silver nanoparticles.

5. Demonstration of SPR properties of gold nanoparticles.

6. Construction of bimetallic nanoparticles and their studies on their optical properties.

7. Interaction of nanoparticles with biological cells (Haemolysis or antimicrobial activities).

8. Loading of fluorescent molecules on nanoparticles.

9. Preparation of antimicrobial polymeric films.
10. Synthesis of Nanoparticles by physical method & Chemical Method.
11. Green synthesis of Nanoparticles using Plant system from Leaves, fruit, callus etc.
12. Characterization of Nanoparticles using UV Visible Spectroscopy, XRD, FTIR.
13. Visualization of Nanomaterials using SEM, TEM, AFM.
14. To check the bioactivity of Nanomaterials on various pathological Fungi and Bacteria.
15. To check the effect of Nanomaterials on Plant germination parameters.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Atten dance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

FUNDAMENTALS OF INFORMATION AND COMMUNICATION TECHNOLOGY LAB

Course Code: ICT523   **Credit Units: 01**

Course Contents:

List of Experiments

1. To test Binary, Decimal, Octal, Hexadecimal Representation and their inter conversions.
2. To test and implement Peer to Peer model.
3. To test and implement Client –Server.
4. To test and implement BUS, Ring and Star Topology.
5. To configure and test working of switch.
6. To demonstrate working of router configuration.
7. To build small LAN using various network components.
8. Identify and compare different transmission media.
9. Demonstration of FTP, SMTP and HTTP Protocols.
10. Test of Ping and trace out commands.
11. Simulation of Data traffic and congestion.
12. Identification of IP address.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Fundamentals of Environment Science and Technology Lab

Course Code: ICT 525   **Credit Units: 01C:1**

Course Objective: The main aim of this course is to understand the importance of samplingand laboratory work in the study of Environmental Sciences and is committed to educate the student in laboratory skills and hopes that they will take full advantage of this opportunity.

LIST OF EXPERIEMNTS

1. Determination of Alkalinity in the water sample.
2. Determination of dissolved oxygen (DO) in the water sample.
3. Determination of Biological Oxygen Demand (BOD) in the water sample.
4. Determination of chemical oxygen demand (COD) in the water sample.
5. Determination of pH, Conductivity and turbidity in some drinking water sample and preparation of report.
6. Determination of residual chlorine in the water sample.
7. Determination of pH and conductivity of soil/ sludge samples.
8. Determination of moisture content of soil sample.
9. Determination of Total dissolved solids in water / effluent sample.
10. Preparation of Urea-Formaldehyde polymer.
11. To determine a) λ max of the solution of $KMnO_4$ b) Verify Beer's law and find out the concentration of unknown solution by spectrophotometer.
12. To determine the concentration of iron in water sample
13. Determine concentrations of gaseous pollutants in air samples such as SO_2 and NO_x by usage of high volume samplers with gas kit attachments of NO_x and SO_2 and lab analysis through colorimetric methods.
14. To determine the concentration of particulate matter in the ambient air using High volume Samplers($PM_{10}$and$PM_{2.5}$).

Text & reference books:

- Lab Book on General Chemistry. LAP LAMBERT Academic Publishing, OmniScriptum GmbH & Co. KG, Germany ISBN 9783-659-52374-8. 2014. Era Upadhyay.
- Handbook of environmental management and technology: Gwendolyn Holmes.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

COMMUNICATION SKILLS - III

Course Code: BCS 501   **Credit Units: 01**
Course Objective:
To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.
Course Contents:
Module I
Reading Comprehension
Summarising
Paraphrasing
Module II
Essay Writing
Dialogue Report
Module III
Writing Emails
Brochure
Leaflets
Module IV: Introduction to Phonetics
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice
Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

UNDERSTANDING SELF FOR EFFECTIVENESS - V
(GROUP DYNAMICS AND TEAM BUILDING)

Course Code: BSS505   **Credit Units: 01**

Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Understanding Self for Effectiveness, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - V

Course Code: **FLT 501**   **Credit Units: 02**

Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life.

Course Contents:

Module D: pp. 131 – 156 Unités 10, 11

Contenu lexical: **Unité 10:** Prendre des décisions

1. Faire des comparaisons

2. décrire un lieu, le temps, les gens, l'ambiance

3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
    2. supposition : Si + présent, futur
    3. adverbe - caractériser une action
    4. pronom "Y"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - V

Course Code: FLG 501 **Credit Units: 02**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module II: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs

Verbs with accusative case

Verbs with dative case

Difference in usage in the two cases

Module IV: Verbs with fixed prepositions

Verbs with accusative case

Verbs with dative case

Difference in the usage of the two cases

Module V: Texts

A poem 'Maxi'

A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - V

Course Code: **FLS 501**   **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I

Revision of earlier semester modules

Module II

Future Tense

Module III

Presentations in English on

Spanish speaking countries'

Culture

Sports

Food

People

Politics

Society

Geography

Module IV

Situations:

En el hospital

En la comisaria

En la estacion de autobus/tren

En el banco/cambio

Module V

General revision of Spanish language learnt so far.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

JAPANESE - V

Course Code: **FLJ 501**   **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write language comfortably and be able to converse using different patterns and forms taught throughout. Students are taught and trained enough to get placed themselves in Japanese companies.
Note: Teaching is done in roman as well as Japanese script.
Course Contents:

Module I
Dictionary form of the verbs, Joining of verbs
Negative form of verbs

Potential form

Module II
Joining of many actions together
Usage of dictionary form of the verbs in sentences
Introducing colloquial language.

Module III
Direct form of the speech, quotations,
Expressing thoughts
Actions and reasoning

Module IV
Conclusion
Receiving and giving things, favour etc.
Different forms like 'tara' form.

Module V
Revision of the whole syllabus

Learning Outcome
➢ Students can speak and use different patterns, ways to describe a particular situation and can converse comfortably in mentioned situations throughout.
➢ Students can appear in the interviews for placements in Japanese companies.

Methods of Private study /Self help

➢ Teaching will be supported by handouts, audio-aids, and self-do assignments and role plays.
➢ Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

Text:
- Teach yourself Japanese

References:
- Shin Nihongo no kiso 1

CHINESE – V

Course Code: FLC 501   **Credit Units: 02**

Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills

Dialogue practice

Observe picture and answer the question.

Pronunciation and intonation.

Character writing and stroke order

Module II

Intonation

Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……

Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.

Compliment of degree "de".

Module III

Grammar the complex sentence "suiran … danshi…."

Comparison – It is colder today than it was yesterday…..etc.

The Expression "chule….yiwai". (Besides)

Names of different animals.

Talking about Great Wall of China

Short stories

Module IV

Use of "huozhe" and "haishi"

Is he/she married?

Going for a film with a friend.

Having a meal at the restaurant and ordering a meal.

Module V

Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?

Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?

Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

NANOTECHNOLOGY IN BIOLOGY AND MEDICINE

Course Code: ICT 601   **Credit Units: 03**

Course objective: The combination of biology and nanotechnology has led to a new generation of nano-devices that make it possible to characterize the chemical, mechanical, and other molecular properties, as well as discover novel phenomena and biological processes occurring at the molecular level. These advances provide science with a wide range of tools for biomedical applications in therapeutic, diagnostic, and preventive medicine. Major objective of this course is to introduce students to recent applications of nanotechnology in biology and medicine.

Course contents
Module I: Introduction to Nanobiotechnology and Nanomedicine
Overview of Nanobiotechnology and Nanomedicine, their developments, nanomaterials used in biology and medicine,rules governing the health and safety standards related to the use of chemicals and Nanobiotechnology and Nanomedicine.
Module II: Nano-Bio interface and its importance
Physical, chemical and biological concepts at Nano-Bio interface. Stability of nanomaterials in biological system, *in-vivo* and *in-vitro* applications of various nanomaterials and conceptual understanding microscopies and spectroscopic techniques. Biological barriers to nanocarrier-mediated delivery of therapeutic and imaging agents, nanoparticle contrast agents for molecular magnetic resonance imaging. Nanotechnology in cancer.
Module III: Nanotoxicity and societal implications
Fundamentals of nanomaterials and toxicity evaluation: cyto-toxicity, geno-toxicity, *in-vivo* tests/assays. Recent developments in nanotoxicity and basic concept of green synthesis. From the first industrial revolution to the nano revolution, implications of Nanoscience and nanotechnology on Society, Nano policies, Nano arms race, public perception and public involvement in the nano discourse, Harnessing nanotechnology for economic and social development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Books:
- Nanotechnology in Biology and Medicine: Methods, Devices, and Applications by Tuan Vo-Dinh, Tuan Vo-Dinh, CRC Press, ISBN: 9780849329494 - CAT# 2949.
- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiley 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christof M. Niemeyer, Wiley 2007, ISBN: 978-3-527-31673-1.
- Nano: The essentials - Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7 / 0071548297.

ENZYMOLOGY AND ENZYME TECHNOLOGY

Course Code: ICT 602   **Credit Units: 03**

Course Objective:
The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I: Enzymes
Introduction and scope, Nomenclature, Mechanism of Catalysis.

Module II: Enzyme Kinetics
Single substrate steady state kinetics; Michaelis Menten equation, Linear plots, King-Altman's method; Inhibitors and activators; Multisubstrate systems; ping-pong mechanism, Alberty equation, Sigmoidal kinetics and Allosteric enzymes

Module III
Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module IV: Enzyme reactors
Reactors for batch/continuous enzymatic processing, choice of reactor type; idealized enzyme reactor systems, Mass transfer in enzyme reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reaction.

Module V: Bioprocess Design
Physical parameters, reactor operational stability, Immobilized cells.

Module VI: Challenges and future trends
Enzyme catalysis in organic media; catalytic antibodies and non protein biomolecules as catalysts, biocatalysts from extreme thermophilic and hyper thermophilic Archae and Bacteria.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References books

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

ARTIFICIAL INTELLIGENCE

Course Code: ICT 603   **Credit Units: 03**
Course Objective:
The primary objective of this course is to provide an introduction to the basic principles, techniques, and applications of Artificial Intelligence. The emphasis of the course is on teaching the fundamentals and not on providing a mastery of specific commercially available software tools or programming environments. Upon successful completion of the course, you will have an understanding of the basic areas of artificial intelligence search, knowledge representation, learning and their applications in design and implementation of intelligent agents for a variety of tasks in analysis, design, and problem-solving. You will also be able to design and implement key components of intelligent agents of moderate complexity in Java and/or Lisp or Prolog and evaluate their performance. Graduate students are expected to develop some familiarity with current research problems and research methods in AI by working on a research or design project.

Course Contents:
Module I: Introduction
AI and its importance, AI Problem, Application area.
Module II: Problem Representations
State space representation, problem-reduction representation, production system, production system characteristics, and types of production system.
Module III: Heuristic Search Techniques
AI and search process, brute force search, depth-first search, breadth-first search, time and space complexities, heuristics search, hill climbing, best first search, A*, AO* algorithm, constraint satisfaction, and beam search.
Module IV: Knowledge Representation issues using predicate logic
Representation and mapping, knowledge representation mechanism, inheritable knowledge, Prepositional logic: syntax and semantics, First Order Predicate Logic (FOPL).
Module V: Expert System
Basic understanding of Fuzzy Logic, Artificial Neural Network, Perceptron, Natural Language Processing, Pattern Recognition, Robotics, LISP and Prolog. The role of Artificial intelligence in Biotechnology. Introduction to Bio-inspired computing.

Examination Scheme:

Components	CT	A/Q	Attd	EE
Weightage (%)	15	05	5	70

Text & References:
Text:
- Artificial Intelligence – II Edition, Elaine Rich, Kevin Knight TMH.

References:
- Foundations of Artificial Intelligence and Expert Systems, V S Janakiraman, K Sarukesi, P Gopalakrishan, Macmillan India Ltd.
- Introduction to AI and Expert System, Dan W. Patterson, PHI.

HUMAN BEHAVIOR AND BASIC PHYCHOLOGICAL PROCESSES

Course Code: ICT 604   **Credit Units: 03**

Course Objectives:
   This course is designed to introduce the science of psychology. It identifies and defines the theories, terms, methods, and various fields of psychology. This course can be used as a foundation towards continued education in more specific areas of psychology. Upon completion of this course, student should have completed the following objectives:
   - Demonstrating knowledge and understanding of theory and research in the general domains of psychology
   - Understanding the overarching themes, questions, and conflicts in psychology

Module1
Introduction-
Definition, Methods and Branches of Psychology. Schools of Psychology –   Psychoanalysis, Behavioural and Gestalt

Module 2
Learning processes: nature and factors of learning; theories: trial and error, conditioning – classical and operant; insight; transfer of training, programme learning. **Memory:** Nature of encoding, storage and retrieval; STM LTM, types of memory, Factors of Retrieval.

Module 3
Motivation: Definition; Types – Biological and Social; Theories – Concept of Drive, Incentive; Maslow's Need Hierarchy Theory and Mc Clelland's Theory of Motivation.

Module 4
 Intelligence: Definition, Nature, Classification; Theories – Spearman, Thurstone, Guildford.

Module 5
 Emotion- Nature, Theories: James Lange, Cannon-Bard, Schachter – Singer and Cognitive Appraisal.

Module 6
Personality: Definition, Trait and Type theories of personality, measurement of personality

Texts and References

Baron, R.A. : Psychology: The Essential Science. Allyn and Bacon, New York, 1995.

Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J: Introduction to Psychology
         (International Student Edition) McGraw Hill Book Co., 1986.

Zimbardo, P.G. & Weber, A.L.: Psychology, Harper Collins College Publishers. New
         York, 1997.

ENVIRONMENTAL SYSTEMS MODELLING

Course Code: ICT 605   **Credit Units: 03**

Course Objective:
The course will provide a basic introduction to environmental modeling, categorize different environmental models and provide insights into the use of computer models in environmental sciences. It will give the students a good understanding of the strengths and limitations of models required for critical analysis of environmental problems. Students will develop a comprehensive understanding of software, hardware related to applications of differentcategories of models in environmental sciences and will learn to use the models to diagnose current problems and forecast future scenarios.

Course Contents:

Module I
Environmental systems-an introduction, an overview of mathematical models applied to various environmental issues, Concept, Need, Scope and objectives of environmental modelling

Module II
What is a model?, Model classification – Brief review of different types of models: Physical models, Conceptual models, Mathematical Models
Data analysis techniques using statistical software such as SPSS/R -Measurements of central tendency (Arithmetic Mean, Medianand Mode), testing of statistical hypotheses , ANOVA, correlation, rank correlations, brief introduction to non-parametric statistics.
Probability – Concept, Bayes' theorem. Probability Distributions - Binomial, Poisson and Normal.

Module III
Simulation models: Mechanistic Models, Empirical Models, Stochastic Models; Heuristic Models, Deterministic Models; Model Fitting, Model Calibration,
Model structure including basic idea of processes and spatial and temporal scales used in the model;Model components: Equations, Input Data, Parameters Values; Implementation

Module IV
Comparing model predictions with observational data
Validation of models: Examples
Population Dynamics Predator-Prey (Lotka-Volterra methods)
Compartment Flow models: Example

Module V
Uncertainty in the model: Uncertainty in model outputs, Uncertainty due to Parameter errors, Input data and equation Errors, Monte Carlo simulations; Determining Model Uncertainty and Sensitivity using Monte Carlo simulations;
Variability in the model –Variance and other statistical approaches to assess variability in model outputs, temporal and spatial variability in the model outputs, the use of multiple models, statistical approaches, and evaluateappropriateness of these methods and how to utilize them.

Module VI
Air Quality Modeling: An overview; Objectives and aim of modeling, approaches to model building, components of air quality models, data quality of inputs to air quality models, classification of models; Gradient transport model; Eddy diffusion model; Gaussian Plume model – Point, line, area and multiple source models; Applications of Gaussian plume model such as fugitive dust modeling ; Source apportionment modeling using methods such as principal component analyses, positive matrix factorization etc. Eulerian models-Multi-scale, three

dimensional prognostic models simulating atmospheric chemical reactions and transformation of gaseous and particulate pollutants.Evaluation of model performance, assess accuracy and utilization of modeled data.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

Text &References:

- Smith J. and Smith P. (2007). Introduction to Environmental Modelling. Oxford: Oxford University Press.
- Keesman K. (1993) Modelling change in environmental systems. Chichester : Wiley
- Morrison J. and Morecroft M.D. (2006) Plant growth and climate change. Oxford; Ames, Iowa: Blackwell Pub.
- Hardisty J. (1993) Computerised environmental modelling: a practical introduction using Excel, Chichester: Wiley.
- A. Ramaswami et al, "Integrated Environmental Modelling", John Wiley, 2005.
- J. Schnoor, "Environmental Modelling", John Wiley , New York, 1996.
- M.Z. Jacobson, "Fundamentals of Atmospheric Modelling", Cambridge University Press, 2005.
- S.C. Chapra,"Surface water quality modelling", McGraw Hill., New York.
- Schnelle, K. B. and Dey, P.R., "Atmospheric Dispersion Modelling Compliance (1999) Guide", McGraw-Hill.
- Turner, D.B, Workbook of Atmospheric Dispersion Estimates", 2nd ed., 1994 Ann Arbor, MI: Lewis Publishers.
- Benarie, M.M. (1980). Urban Air Pollution Modelling (Cambridge, MA: The MIT Press).

NANOTECHNOLOGY IN BIOLOGY AND MEDICINE LAB

Course Code: ICT 621 **Credit Units: 01**

List of experiments:

1. OHS for nanobiotechnology and nanomedicine.
2. Green synthesis of gold and silver nanoparticles and their SPRproperties.
3. Use of biological molecules in preparation of metal nanoparticles.
4. Control of composition of nanoparticles with amino acids for biological applications.
5. Characterization of surface properties of nanoparticles.
6. Preparation of fluorescent capped nanoparticles for imaging applications.
7. Constriction of nano-zymes and investigation of nano-zyme like behaviour of nanoparticles.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ENZYMOLOGY AND ENZYME TECHNOLOGY LAB

Course Code: ICT 622   **Credit Units: 01**
Course Objective:

The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I
Isolation of enzymes from plant and microbial sources.

Module II
Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III
Purification of Enzyme by ammonium sulphate fractionation.

Module IV
Enzyme Kinetics: Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity ($V_{max.}$) using Lineweaver-Burk plot.

Module V
Effect of Temperature and pH on enzyme activity.

Module VI
Enzyme immobilization
Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

Text:
- Practical Biochemistry, Sawhney and Singh

References:
- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker

HUMAN BEHAVIOR AND BASIC PHYCHOLOGICAL PROCESSES LAB

Course Code: ICT 624   **Credit Units: 01**

Course Objective:

This course will enable students to understand and apply the general concepts of psychology through experiments & psychological tests. Every student is expected to perform and write any 10 experiments & tests mentioned below.

List of Practicals:

1. Muller Lyer Illusion
2. Stroops Test
3. Movie/Film/TV serial analysis (Psychology theme)
4. Test of Intelligence
5. Achievement Motivation
6. Prejudice test
7. Multiple IQ
8. Learning Style Questionnaire
9. Aggression Test
10. Bilateral Transfer of Training
11. Span of attention

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

ENVIRONMENTAL SYSTEMS MODELLING LAB

Course Code: ICT 625   **Credit Units: 01**

Course Objectives: The main aim of this course is to understand the importance of understanding and usingeffective data analyses and modeling techniquesin the study of Environmental Sciences to properly interpret environmental data in order to understand environmental related problems and help in effective decision making to solve the problem. The course iscommitted to educating the students in using appropriate software for different data analyses techniques in computer laboratoryand hopes that they will take full advantage of this opportunity.

LIST OF EXPERIEMNTS

1. Plotting time series with different averaging times .
2. Daily means from hourly means — processing wind direction data
3. Usage of box plots
4. Hierarchical clustering
5. The polarFreq function
6. The polarPlot and polarCluster functions
7. Usage of Scatterplots, pie-charts
8. Linear Trend Analyses
9. The linear Relation function
10. Model evaluation — the modStats function
11. Preparing data to compare sites, for model evaluation and intervention analysis
12. Analysis f of different meteorological parameters
13. The WindRose and PollutionRose functions
14. The Percentile Rose function

Text & reference books:
1. R Core Team (2016). R: A language and environment for statisticalcomputing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.
2. Carslaw, D. C. and K. Ropkins, (2012) openair -an R package for air quality data analysis. Environmental Modelling & Software. Volume 27-28, 52-61.
3. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
4. Advance Excel.

COMMUNICATION SKILLS - IV

Course Code: **BCS 601**   **Credit Units: 01**

Course Objective:

To enhance the skills needed to work in an English-speaking global business environment.

Course Contents:

Module I: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices

Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Individualised pronunciation practice

Module II: Social Communication

Building relationships through Communication

Communication, Culture and Context

Entertainment and Communication

Informal business/ Technical Communication

Module III: Business Communication

Reading Business/ Technical press

Listening to Business/ Technical reports (TV, radio)

Researching for Business /Technology

Module IV: Presentations

Planning and getting started

Design and layout of presentation

Information Packaging

Making the Presentation

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

UNDERSTANDING SELF FOR EFFECTIVENESS - VI
(STRESS AND COPING STRATEGIES)

Course Code: **BSS605**   **Credit Units: 01**

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.

To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress

Meaning & Nature

Characteristics

Types of stress

Module II: Stages and Models of Stress

Stages of stress

The physiology of stress

Stimulus-oriented approach.

Response-oriented approach.

The transactional and interact ional model.

Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress

Personal

Organizational

Environmental

Module IV: Consequences of stress

Effect on behaviour and personality

Effect of stress on performance

Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management

Importance of stress management

Healthy and Unhealthy strategies

Peer group and social support

Happiness and well-being

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

FRENCH - VI

Course Code: **FLT 601**   **Credit Units: 02**

Course Objective:

To strengthen the language of the students both in oral and written so that they can:

i) express their sentiments, emotions and opinions, reacting to information, situations;

ii) narrate incidents, events;

iii) perform certain simple communicative tasks.

Course Contents:

Module D: **pp. 157 – 168 – Unité 12**

Unité 12: s'évader

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - VI

Course Code: **FLG 601**   **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Adjective endings

Adjective endings in all the four cases discussed so far

Definite and indefinite articles

Cases without article

Module II: Comparative adverbs

Comparative adverbs as and like

Module III: Compound words

To learn the structure of compound words and the correct article which they take

Exploring the possibility of compound words in German

Module IV: Infinitive sentence

Special usage of 'to' sentences called zu+ infinitive sentences

Module V: Texts

A Dialogue: 'Ein schwieriger Gast'

A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts

Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – VI

Course Code: **FLS 601**   **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

Course Contents:

Module I
Revision of the earlier modules

Module II
Present Perfect Tense

Module III
Commands of irregular verbs

Module IV
Expressions with **Tener que** and **Hay que**

Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

JAPANESE - VI

Course Code: **FLJ 601**   **Credit Units: 02**

Course Objective:

To enable the students to converse in the language with the help of verbs and the usage of different sentence patterns, which help them to strengthen the language.

Students are taught and trained enough to get placed in Japanese companies.

Note: The teaching is done in roman as well as Japanese script. 10 more kanjis are introduced in this semester.

Course Contents:

Module I: Polite form of verbs

Expressing feelings with the polite forms of verb.

Module II: Potential form

Ability of doing or not doing something

Module III: Conjunctions

Joining two sentences with the help of *shi* and *mo*

Module IV: Intransitive Verbs

Sentence patterns of indirect speech

Module V: Feelings and expressions

Regret, existence etc.

Learning Outcome

➢ Students can speak the language with the use of different forms of verb.

Methods of Private study/ Self help

➢ Hand-outs, audio -aids, assignments and role-plays will support classroom teaching.

➢ Students are encouraged to watch Japanese movies at Japan Cultural and information center.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Shin Nihon-go no Kiso Lesson No. 26 to 30.
- All vocabulary and topics taught are from the above-mentioned book.

CHINESE – VI

Course Code: FLC 601   **Credit Units: 02**

Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills

Dialogue practice

Observe picture and answer the question.

Pronunciation and intonation.

Character writing and stroke order.

Module II

Going out to see a science exhibition

Going to the theatre.

Train or Plane is behind schedule.

Indian Economy-Chinese Economy

Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

Module III

Temperature – how to say – What is the temperature in May here?

- – How is the weather in summer in your area?
- – Around 30 degrees
- – Heating, air-conditioning

– Is winter is Shanghai very cold?

Talking about birthdays and where you were born?

The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.

Tell the following in Chinese – My name is …. I was born in … (year). My birthday is ……… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ………. (do what)? At week end, I ………. On Sundays I usually …………… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ………. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Elementary Chinese Reader Part-2 ,3 ; Lesson 47-54