SANT GADGE BABA AMRAVATI UNIVERSITY GAZETTE

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PART- TWO

Thursday, the 6th February, 2020

NOTIFICATION

No.14 / 2020 Date: 06/02/2020

Subject: Introduction of new syllabi for M.Phil. (One Year Full Time Degree Course) (Semester Pattern) in the subjects Mathematics, Statistics, Physics, Chemistry, Botany & Zoology in the faculty of Science & Technology (Science Group) which to be implemented from the academic session 2019-20 & onwards.

It is notified for general information of all concerned that the authorities of the University have introduced new syllabi for M.Phil. (One Year Full Time Degree Course) (Semester Pattern) in thesubjects Mathematics, Statistics, Physics, Chemistry, Botany & Zoology in the faculty of Science & Technology (Science Group) which to be implemented from the academic session 2019-20& onwards, as given in Appendix-A, B, C, D & E respectively.

It is further notified that, the eligibility criteria and other details along with the Scheme of Examinations shall be as provided under Direction No. 22 of 2019 & 53 of 2019 resspectively.

Sd/-
(Dr.H. R.Deshmukh)
I/c Registrar,
Sant Gadge Baba Amravati University

Appendix-A
Syllabus prescribed for M.Phil (One Year Full Time Degree Course)
(Semester Pattern)
in the Faculty of Science & Technology (Science Group)
Implemented from the academic session 2019-20
Semester-I
Paper-I
Research Methodology

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks -20

Aims and Objectives of Research Methodology

To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies);

1. To portray accurately the characteristics of a particular individual, situation or a group(studies with this object in view are known as descriptive research studies);
2. To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies);
3. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).

Learning outcomes

- To be able to identify and describe methods within the philosophy of science in general such as rationalism, empiricism, positivism, and falsificationism and problems concerning observation, induction, scientific explanations and rationality.
- To acquire an overview of important characteristics within technological research and development: Aims and methods, the relation between pure science on the one hand and applied research on the other, the relation between research and practice, and the relation between technology and society.
- To demonstrate an understanding of the limits and possibilities for research in science and technology.
- To acquire skills of presenting arguments and results of scientific and technological research.

Unit-I: Introduction to Research Methodology (16 Marks)

Definition of research, Objective of research, Characteristics of research, General and Specific, Conditions & Criteria of good research, Kinds of research methodologies- Historical research, developmental research, descriptive research, correlational, casual-comparative, experimental research and scientific/ applied research, Types of research- Descriptive *vs.* Analytical, Applied *vs.* Fundamental, Quantitative *vs.* Qualitative, Conceptual *vs.* Empirical, Overview of research methodology in various areas, Defining the concrete research problem & focusing on it.

Unit-II: Research Problem Formulation and Quality Indices of research publication (16 Marks)

Sources of literature, web sources, various referencing procedures, Identifying the research areas from the literature review and research database, Web Surfing: Google Scholar, Scopus, research techniques, Phrase searching, truncation, proximity operators, Parentheses, Problem Formulation, Identifying variables to be studied, determining the scope, objectives, limitations, assumptions and applicability of the identified research problem,

Developing a research plan: Exploration, Description, Diagnosis and Experimentation

Quality Indices of research publication: Impact Factor, H-index, science citation index etc.

Unit-III: Methods of Data collection (16 Marks)

Objective & Classification, methods of data collection, Tools of data collection, field work & field Methods, Survey Methods, Experimental methods. Basic Concepts concerning testing of hypotheses, procedures of hypothesis testing, generalization and interpretation Applied statistics: Correlation & Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis Software tools for modeling.

Unit-IV: Research reports and Paper/ Thesis writing (16 Marks)

Introduction: Structure and components of scientific reports, types of report, procedure, developing research proposal.

Types of research publications: Research Paper, review articles, charts, short communication, research notes/ letters.

Writing paper: Audience, organization and structure, title, author list, date, abstract, keywords, subject.Computational experiment tables, graphs, citations, conclusion, acknowledgement, appendix, reference list.

Publishing a paper: Choosing Journal, submitting manuscript, the refereeing process. Review Process and correction: Peer review, Types & Process.

Thesis writing: Different steps and software tools in the design and preparation of thesis, layout, structure and language and style of typical reports, Illustrations and tables, graphs, bibliography, referencing and footnotes

Unit-V: Research Ethics and IPR (16 Marks)

Ethics: Ethical issues, Ethical Committee

IPR: intellectual property rights and patent law, techniques of writing a Patent, filing procedure, technology transfer, commercialization, copy right, royalty, trade related aspects of intellectual property rights, plagiarism tools.

The norms relating to internal assessment in each paper shall be as under :-

1)	Home assignment	- 5 Marks
2)	Seminar	- 5 Marks
3)	Group discussion	- 5 Marks
4)	Library Work/Analysis of Research Papers	- 5 Marks
	Total -	20 Marks

References:

1. Research Methodology by LPU, Publication Excel Book Pvt. Ltd., New Delhi- 2012.
2. How to write a paper by Hall G.M , publication: BMJ Pub. India-2003
3. Research Methodology: Tools & Techniques by Prabhal Pandey and Meenu Pandey,
4. Publication Bridge Center, Romania 2015(ISBN:978-606-93502-7-0)
5.Raghu Korapatti , Five Chapler Model for research, Thesis writing, Diamond Books, New Delhi- 2007.
6.Fundamental of Research Methodology and Statistics, Yogesh Kumar Singh, New Age International Publishers.
7.Ranjit Kumar, "Research Methodology: A Step by Step Guide for Beginners", SAGE Publications Ltd., 2011.
8.Wayne Goddard, Stuart Melville, "Research Methodology: An Introduction" JUTA and Company Ltd, 2004.
9.C.R. Kothari ,"Research Methodology: Methods and Trends", New Age International,2004
10.S.D. Sharma , "Operational Research", Kedar Nath Ram Nath& Co.,1972
11. B.L. Wadehra,"Law Relating to Patents,Trademarks, Copyright Designs and Geographical Indications", Universal Law Publishing, 2014.
12.Donald Cooper, Pamela Schindler, "Business Research Methods", McGraw-Hill publication, 2005.
13.Higham Nicholas J., Handbook of writing for the mathematical science, SIAM, 1961.

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Appendix-B
Semester – I
Paper-II
Recent Trends in Mathematics

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks - 20

Objectives:

O1: The design of this course is to understand the recent trends in Mathematics.
O2: Researchers should have basic background of core subject of Mathematics.
O3: Researchers should have knowledge of at least one of Mathematical Software.
O4: Basic objective to learn this course is to develop logical techniques and Analytical skill.
O5: At the end of the course, students should be able to: know and demonstrate understanding of the concepts from the four branches of mathematics (Algebra, Functional Analysis, Partial Differential Equation, Relativity & Cosmology) and will develop the MathematicalSkill (MATLAB).

Learning Outcomes:

After completion of this course/study researchers are able to
LO1: Understand basic concept in Advanced Algebra
LO2: Understand basic concept in Advanced Analysis
LO3: Understand basic concept in Differential Equation
LO4: Understand basic concept in Relativity/ Gravitational Theory
LO5: Understand basic knowledge of computational soft skill.

Unit I: Algebra **(16 Marks)**

Polynomial Rings and Galois Theory: Definition and basic properties, Polynomial rings over field- I, Polynomial rings that are UFDôs , irreducibility criteria, Polynomial ring over fields ï II, polynomial in several variables over a field and Grobner Bases. Basic definitions, Fundamental theorem of Galois Theory, finite fields, composite extension and simple extension, Cyclostomic extensions and Abelian extension over Q, Galois group of polynomials.

Unit-II: Functional Analysis **(16 Marks)**

Unbounded Linear Operators in Hilbert Space: Unbounded Linear Operators and their Hilbert Adjoint Operators, Hilbert- Adjoint Operators, Symmetric and Self-Adjoint Linear Operators, Closed Linear Operators and Closures, Spectral Properties of Self-Adjoint Linear Operators, Spectral Representation of Unitary Operators, Spectral representation of Self-Adjoint Linear Operators, Multiplication Operators and Differentiation Operator, Unbounded Linear Operators in Quantum Mechanics: Basic idea, States, Observables, Position Operators, Momentum Operator, Heisenberg Uncertainty Principle.

Unit-III: Differential Equation **(16 Marks)**

Wave and Diffusion equations: The Occurrence of wave equation, Elementary solution of the one dimension wave equation, Riemann Voltera Solution of one dimension wave equation, Application of the calculus of variations, three dimensional problem, General solution of wave equation, Greenôs function for wave equation, Non-Homogeneous wave equation, Rieszôs Integral diffusion equation, occurrence of diffusion equation, Elementary solution of the diffusion equation, separation of variable, Transform: Mellin Transform, Hankel Transform, Integral Transform, The use of Integral transform and Greenôs function.

Unit-IV: Relativity and Cosmology **(16 Marks)**
Wormholes: The notion of a Wormhole, A wormhole as a time machine, Wormhole as solution to gravitational field equations, spherically symmetric wormholes general properties, wormhole construction by solving the trace of the Einstein equations, Alternative gravity and vacuum as wormhole supporters.

Unit-V: Introduction to MATLAB **(16 Marks)**
A Minimum MATLAB Session, Creating and working with Arrays of Numbers, Creating and Printing Simple Plots, Creating, Saving, and Executing a script File, Creating and Executing a function File, Working with Files and Directories, Matrices and vectors, Matrix and array operations, Plotting simple graphs, Basic 2-D Plots, 3-D Plots.

The norms relating to internal assessment in each paper shall be as under :-

1) Home assignment - 5 Marks
2) Seminar - 5 Marks
3) Group discussion - 5 Marks
4) Library Work/Analysis of Research Papers - 5 Marks

Total - 20 Marks

References:

1] Abstract Algebra by D. S Dummit and R.M Foote, Wiley India Pvt. Ltd, 2004 Third Edition (Points: 9.1 to 9.6, 14.1 to 14.6)
2] David Dummit and Richard Foote, ñAbstract Algebraò, John Wiley and Sons.
3] Joseph A. Gallian, ñContemporary Abstract Algebraò, (Fourth Ed.), Narosa, 1999.
4] I.N.Herstein : Topics in Algebra.
5] I. S. Luthar and I. B. S. Passi, ñAlgebra-Vol. 1: Groupsò, Narosa, New Delhi, 1996.
6] P. B. Bhattacharya, S. K. Jain and S. R. Nagpaul, ñBasic Abstract Algebraò, (Second Ed.), Cambridge Univ. Press (Indian Ed.1995)
7] V.K. Khanna, S.K. Bhambri, ñA Course in Abstract Algebraò, Vikas Publishing House. (Second Edition)
8] E. Kreyszig, Introductory Functional Analysis with application, john Wiley & Sons, New York, 1978
9] Some topics in Non-Linear Functional Analysis by M.C Joshi & R. K Bose, Publication: Wiley & Sons.
10] Balmohan V. Limaye: Functional Analysis, New Age International Pvt Ltd. 2007, Revised Second Edition,.
11] G. Bachman and L. Narici ñFunctional Analysisò Academic Press 1966.
12] G. F. Simmons, ôIntroduction to Topology and Modern Analysisô Tata McGraw-Hill Publishing Company Ltd., New Delhi (3rd reprint 2005)
13] D. Somasundaram , ñA First Course in Functional Analysisò Narosa Publication.
14] Elements of Partial Differential Equation by IAN Sneddon. (Chapter-5 (Points: 1 to 9) & Chapter-6 (Points: 1, 3, 4, 5, 6)
15] Larry C. Andrews and Bhimsen K. shivamoggi: Integral Transforms for Engineers, PHI, 3rd Indian Reprint 2003.
16] I. N Sneddon: The use of Integral transform, Mc Graw Hill.
17] Black holes, Cosmology and Extra Dimensions by Kirill A Bronnikov and Sergey G Rubin, Publication: World Scientific Ed. 2013, (Chapter-5: points: 5.1, 5.2, 5.3)
18] Weinsberg S. Gravitation and cosmology principles and applications of the General theory of Relativity, Wiley Publication, 1972, ISBN: 0471925675
19] Getting Started with MATLAB by Rudra Pratap, Oxford University Press, 2008 (Seventh Impression) (points: 2.1 to 2.6, 3.1, 3.2, 3.7, 6.1, 6.3)

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Semester – I
Paper-II Recent Trends in Statistics

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks - 20

Course Objectives :

1. To understand the recent trends in various fields like advance statistical inference, Operations research and regression models.
2. To understand new concepts in different areas of research in statistics.
3. To fulfil todayôs need of data analysis, detail study of statistical software R is included in the Syllabi.

Course Outcomes :

At the end of course, students will be familier with the concepts like :

1. Robustness, UMPI Test, combinations of p ï values.
2. Geometric programming and Stochastic programming.
3. Concept of reliability and life distribution.
4. Linear and non linear models, Generalized linear model and logistic regression models.
5. Will be expert in all statistical tests for data analysis using R software.

(1) Advance Statistical Inference : (16 Marks)

i) Approaches to Statistical inference, Likelihood, frequency and Bayes approaches, sufficiency, ancillary statistics.

ii) Testing of hypothesis, locally most powerful and invariant test, UMPI test, UMPI property of standard test, P-value, combination of P-values. Robustness: mean and median, M-estimator.

(2) Advance Operations Research (16 Marks)

i) Geometric programming : unconstrained minimization problem, solution using geometric inequality and Kuhn Tucker theory.

ii) Stochastic programming : charneôs constraints and their deterministic equivalence, F-, V- and Kalanoka models, two stage programming, wait and see approach. Use of fractional programming, Ramming.

(3) Reliability : (16 Marks)

Concepts of time, order and random censoring.
Reliability concepts and measures, Life distributions, reliability function, hazard rate, common life distributions exponential, weibull, gamma, Lognormal. Estimation of parameters and tests in these models. LR and MLE test for these distribution.

(4) Regression Models : (16 Marks)

i) Linear and Non linear Models : Difference between Linear and non linear regression models, transformation to a linear model, Intrinsically linear and non linear models. Parameter estimation using the Newton Gauss method.

ii) Generalized linear models : Exponential families, Definition of GLM

iii) Logistic regression Model : Link function, logit, probit, complementary log-log, estimation of parameters, odds ratio.

(5) R – Software for analysis of data (16 Marks)

Methods of data input in R, some useful built in functions in R, Graphical and diagrammatic representation using R, R ï plots to check normality of data.
Statistical test using R : t test, paired t test, test of variance for normal distribution, goodness of fit test. Correlation coefficient, Spearmenôs Rank correlation , Line of regression using R. Generating random sample from Normal, Binomial and Poisson distribution using R.

The norms relating to internal assessment in each paper shall be as under :-

1)	Home assignment	- 5 Marks
2)	Seminar	- 5 Marks
3)	Group discussion	- 5 Marks
4)	Library Work/Analysis of Research Papers	- 5 Marks

	Total -	20 Marks

Name of Books :

1) Cox D.R. and Oakrs D. (1984) : Analysis of survival data., Chapman and Hall, Newyork
2) Debasis Kundu, Ayanendrabath Basu : Statistical computing , Naroja Publishing House
3) Drapa N.R. and Smith H. : Applied regression analysis.
4) G. Hadley : Non linear and Dynamic Programming
5) George Casella : Statistical inference
6) Hilla and Libaman : Introduction to operatiars Research
7) J. K. Ghosh, Mohan Delampady, Tapas Samanta : An introduction to Bayesian analysis : Theory & methods.
8) K.V. Mittal : Optimization Method.
9) Miller R. G. (1981) : Survival Analysis, John Wiley
10) Montgomay D.C. : Linear ngrssion analysis.
11) Sudha G. Purohit, Sharad D. Gore, Shailaja Deshmukh : Statistics using R , Narosa Publishing House.

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Semester I
PaperII
Recent Trends in Physics

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks - 20

Course Objectives:

1. TounderstandthenewconceptsindifferentareaofresearchinPhysics.
2. AcquisitionofadvanceresearchKnowledgeinaresentareaofPhysics.
3. Development of Critical analysis skills and of ability to synthesis the newidea.
4. Topreparethecandidatesforcareersingovernmentalresearch;Industrial research; Academicresearch.

Course Outcomes:

At the end of course, students will be familiar with the concept like:-

1. Hartree-Fock (HF) theory; HF equations; Density Functional Theory; Thomas- Fermi theory; Electron-phononinteraction.
2. Surface structure; Interaction of electrons with surfaces; Characteristicenergy lossesinsolids;Ionizationlosses;Secondarysurfaceeffects.
3. SEM;TEM;AFM;DLS;AES;NMR;ESR Spectroscopy; Mossbauer Spectroscopy; Photoluminescence.
4. AC&DCConductivity;Cyclicvoltammetry;TGA;DTA;DSC;NIRSpectroscopy.
5. Solution growth methods; Nano particle synthesis; Thin filmpreparation techniques; Graphene and Carbonnanotubes.

Unit I: **Introduction to Theories in Condensed Matter Physics** **(16 Marks)**

Hartree and Hartree-Fock (HF) theories: The variational approach, HF equations, ionization potential and electron affinity, shortcomings of HF. Density Functional Theory: variational formulation, LDA exchange and correlation in the electron gas. Thomas- Fermi theory: Kinetic energy functionals, finite temperature generalization, linear TF screening, linear response and Lindhard static susceptibility. Collective Quantum Phenomena in Condensed Matter: Collective modes, Correlation functions and response functions, response of independent electron gas, electron-phononinteraction.

UnitII:**SurfaceMorphologyofsolidmaterials** **(16 Marks)**

Surface structure, thermodynamics of surfaces,importance of surfaces and interfaces in materials performance, surface contamination, surface energy, chemical bonding, interaction of electrons with surfaces,secondary electronemission,energy distribution of secondary electrons, electron scattering, characteristic energy losses in solids, ionization losses, secondary surface effects.

Unit-III:**Characterization Techniques** **(16 Marks)**

Electron microscopy : Scanning Electron Microscopy (SEM), Transmission Electron icroscopy (TEM), Atomic Force Microscopy (AFM),Scanning Probe Microscopy (SPM), Scanning Tunneling Microscopy (STM) & Dynamic Laser Scattering (DLS). Auger Electron Spectroscopy (AES): X-Ray Diffraction, X-Ray Photoelectron spectroscopy (XPS),Ultraviolet Photoelectron Spectroscopy (UPS),Techniques of Infrared (IR),Raman, NMR, ESRS pectroscopy, Mossbauer Spectroscopy, Photoluminescence.

Unit: IV:**Experimental Measurement techniques** **(16 Marks)**

Electrical conductivity: AC & DC Conductivity,Determination of Band gap, Activation energy, transport number, Cyclic voltammetry, Dielectric constant, Experimental measurement of dielectric loss, effect of temperature, frequency & composition on dielectric losses.

Thermogravimetry(TGA), Differential thermal analysis(DTA), Differential scanning colorimetry(DSC), Optical Microscopy: UV ï Visible ï NIR Spectroscopy.

UNIT V : Crystal Growth and Nano-materials synthesis (16 Marks)

Nucleation: solution growth methods: slow cooling ï slow evaporation and temperature gradient methods ï Melt growth: Melt quenching techniques, Bridgman method,Czochralskimethod.

Introduction to nanomaterials, Nano particle synthesis, top-down vs bottomup approach,0D, 1D, 2D, 3D materials, Thin film preparation techniques: thermal evaporation, electron beam evaporation,sputtering, chemical bath deposition, spray pyrolysis, sol gel, Molecular Beam Epitaxy (MBE), Chemical Vapor Deposition (CVD), Atomic Layer Deposition (ALD), Metal organic Chemical Vapor Deposition (MOCVD). Pulsed Laser Deposition (PLD), Carbon based materials, Graphene and Carbon nanotubes.

The norms relating to internal assessment in each paper shall be as under :-

1)	Home assignment	- 5 Marks
2)	Seminar	- 5 Marks
3)	Group discussion	- 5 Marks
4)	Library Work/Analysis of Research Papers	- 5 Marks

	Total -	20 Marks

Recommended Books :-

1. CondensedMatterPhysicsbyM.P.Marder,Wiley,(2000)
2. SolidStatePhysics:anintroductiontoprinciplesofmaterialssciencebyH.Ibach,andH. Luth,Hans,4thEd:Berlin,Springer(2009)
3. Theoretical Solid State Physics: VOl 1 and Vol 2 By W. Jones, N.H. March, Dover Publications.
4. Solid State Physics, by N. W. Ashcroft and D. Mermin, Brooks Cole, (1976), Thomson (India)(2003)
5. IntroductiontoSolidStatePhysics,byC.Kittel,Wiley,7thEdition,(1996).
6. SolidStatePhysics,byG.GrassoandG.P.Parravicini,AcademicPress(2013)
7. AdvancedCondensedMatterPhysics,byL.M.Sander,Cambridge(2009)
8. SolidSurfaces,InterfacesandThinFilmsbyHansLuth,Springer(2015)
9. PhysicsofSurfacesandInterfacesbyH.Ibach,Springer(2006)
10. Surfaces, Interfaces and Colloids: Principles and Application by Drew Myers, 2nd Ed. (1999)
11. MethodsofSurfaceAnalysis,editedbyJ.M.Walls,Cambridge,(1988)
12. GlassScience(SecondEdition)R.H.Doremus,Awiley-IntersciencePublication(1994)
13. 12.M.P.Marder,ResearchMethodsforScience,CambridgeUniversityPress,(2011)
14. C.R.Kothari,ResearchMethodologyMethodsandTechniques,SecondRevisedEdition, New Age International Limited Publishers,(2004).
15. .H.J.C.Berendsen,AstudentguidetoDataandErrorAnalysis,Cambridge University a. Press,(2011).
16. Instrumentation methods of analysis, Willard, L. Merritt, A-Dean and A. Settle, CBS Edition,1986
17. Physical Principles of Electron Microscopy: An introduction to TEM, SEM and AFM: by R.F.Egerton Springer(2005).
18. The Principles and Practice of Electron Microscopy: by Ian. M. Walt-Cambridge University Press,1997.
19. An introduction of X-ray crystallography: byM.M.Woolfson.
20. Characterization of Materials: by John B.Watchman.
21. X-rayandNeutronReflectivity:byJ.DaillantandA.Gilaud(Ed)Springer(2009).
22. Materialanalyticaltechniques:Structuralanalysisï XRD,electrondiffractionï Imaging
    a. techniques ï SEM, TEM, AFM &Principal
23. Photoluminescence ï applications.
24. G.Aruldas,Molecularstructureandspectroscopy,PHI,(2007)
25. M.Sayer,A.Mansingh,MeasurementInstrumentationandExperimentDesigninPhysics andEngineering,PrenticeHallofIndiaPrivateLimited,(2000).
26. K.N.Tu,R.Rosenberg,AnalyticalTechniquesforThinFilms,AcademicPress,INC.1988.
27. CrystalGrowthProcessesandmethodsï P.SanthanaRagavanandP.Ramasamyï KRU Publications, Kumbakonam(2001).

28. ThinFilmFundamentalsï A.Goswamiï NewAgeInternational,NewDelhi(2007).
30. Nanophysics and Nanotechnology, by E. L. Wol, (2nd edition) Wiley-VCH , (2006)
31 NanomaterialsHandbook,Y.Gogotsi,CRC,(2006).
32 HandbookofDepositionTechnologiesforFilmsandCoatings:Science,Applicationsand Technology, by P. M. Martin, (3rd edition), William Andrew,(2009)
33. CarbonMaterialsandNanotechnology,byA.Krüge,PublisherWileyVCH,March(2010.)
34. IntroductiontoNanotechnology,byC.PooleJr.,F.J.Owens,Wiley,(2003)

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Semester – I

Paper-II

Recent Trends in Chemistry

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks - 20

Unit-I: (A) Nano-chemistry **(16 Marks)** **9L**

Introduction, classification, methods of preparation, Physical and Chemical Properties of Nanoscale Materials,Electrical properties, magnetic properties, optical properties, fluorescence, chemical reactivity, self-assembly of various nanostructures and its importance, characterization by modern instrumental techniques and Applications. Special nanomaterials (Fullerenes, carbon nanotubes and their classification, nanorods etc.). Effect of size and shape of nanocrystals on reactivity, comparison of nano-crystalline versus macro-crystalline materials in terms of reactivity. Applications of Nano Metal Oxides and Modified Nano Metal Oxides as Adsorbents.

(B) Green Chemistry: **(16 Marks)** **9L**

Goals and basic principles of Green chemistry, Carbon credit, Atom economy, Examples of green chemistry, catalysis and green chemistry, Green chemistry as an alternate tool for reducing pollution, green solvents (water, CO_2, ionic liquids), solvent-free reactions, epoxidation of alkenes, multi-phase catalysis, environmentally benign solutions, renewable resources, alternative greener technologies (photochemistry, electrochemistry, Sonochemistry and microwave assisted reactions) and alternative energy sources. Biocatalysts and catalytic reactions. Materials recycling ï Bioremediation ï overview and applications ï Microbial biodegradation ï Genetic Engineering approaches ï Advantages ï Monitoring. Introduction ï Benign Design ï Safer solvents ï Pollution Prevention,CFCôs and ozone layer. Waste water treatment by oxidation technology at ambient conditions-remediation methods for textile effluents.

Unit-II: Physical Methods of Structure Elucidation **(16 Marks)** **18L**

An integrated problem-solving approach to the elucidation of structures of organic compounds based on UV, IR, NMR (1H and 13C) and Mass spectral techniques. Modern NMR experiments: NOE, NOESY, DEPT, Correlation spectroscopy (1H-1H and 1H-13C) and HETEROCOSY (1H-13C). Use of electronic, IR, MR (1H, 13C, 19F, 31P), Mossbauer and ESR in the structure elucidation of inorganic and coordination compounds. Interpretation of X-ray spectrum (Powder and single crystal)

Unit-III: **(16 Marks)**

A) Computer Aided Drug Discovery **9L**

Introduction to Drug Discovery and Development, Stages of drug discovery and development,**Lead discovery and Analog Based Drug Design,** Bioisosterism, Classification, Bioisosteric replacement,SAR versus QSAR, History and development of QSAR, Types of molecular descriptors, Methods of molecular descriptor selection, 3D-QSAR approaches like COMFA and COMSIA, **Molecular Modelling and virtual screening techniques, Virtual Screening techniques, Molecular docking,Molecular Modelling**

B) Supramolecular Chemistry: **9L**

Basic concept and principles; History, Molecular recognition, Hydrogen Bonds: Definition, Structure and Stability, strength, Secondary Electrostatic Interactions in Hydrogen Bonding Arrays. Non-covalent interactions: Ion pairing, Ion-Dipole Interactions, Dipole-Dipole interactions, Dipole-Induced Dipole and Ion-Induced Dipole interactions, van der Waals or Dispersion Interactions, Hydrogen bonding, Halogen bonding, Cation- interactions, Anion-pi interactions, pi - pi interactions, Closed shell interactions, Aromatic-Aromatic Interactions: Benzene Crystals, Edge-to-face vs. pi-pi Stacking Interactions, N-H- pi interactions, Sulphur-aromatic interactions, Benzene-Hexafluorobenzene pi-stacking. Biological supramolecular systems: Ionophores, Porphyrin and other Tetrapyrrolic Macrocycles, Coenzymes, Neurotransmitters, DNA and Biochemical Self-assembly. Supramolecular reactivity.

Unit-IV: Catalysis **(16 Marks)** **18L**

Homogenous and heterogeneous catalysis, Fundamental processes in reaction of organo-transition metal complexes: ligand coordination and dissociation, oxidative addition/reductive elimination including cyclometallation reactions, insertion/extrusion, reaction of coordinated ligands, characteristics of transition metal complexes catalyst, high selectivity. Heck, Suzuki, and Negeshi cross-coupling.

Transition metals and their composites as catalytic materials, Activation of molecular hydrogen using transition metals, conditions to be satisfied for catalysis, Molecular activation by coordination and addition compounds, Proximity interaction, elimination, catalytic cycle. Surface catalysis, supported catalysis. Applications of transition metal-organic compounds in catalysis: hydroformylation, hydrogenation of olefins, olefins metathesis, olefins epoxidation Wacker process, and importance of organometallic compounds in certain biological systems, Ziegler-Natta polymerisation, oligomorisation and related reactions.

Enzymes catalysis: Mechanism of enzyme action, acid-base catalysis, co-valent catalysis, enzyme mechanisms for Chymotrypsin and ribonuclease.

Unit-V: Micelles, Surfactants and Interfacial Phenomena **(16 Marks)** **18L**

A) Micelles:

Introduction, classification of surface active agents, micellization, micelle structure and shape, shape transitions, elongated micelles, vesicles, inverted structures, micelle aggregation number, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization, phase separation, and mass action models, solubilization, microemulsion, reverse micelles.

B) **Surfactants and Interfacial Phenomena:** Effect of additives on micellization, macro and micro emulsions, dispersion and aggregation of solids by surfactants. General Considerations: Economic considerations, Sewage and waste disposal problems, trade names and utilization of surfactants. **a) Anionic Surfactants:** sulfated and sulfonated surfactants e.g., sulfated oils, alkylsulfates, alkyl ether sulfates, sulfated mono glycerides, alkyl glyceryl ether sulfonates, sulfated poly carboxylic acid surfactants, alkyl aryl sulfonates, olefin sulfonates,mohogany and petroleum sulfonates and other miscellaneous anionic surfactants. **b) Cationic surfactants:** Non-nitrogen base, e.g., amines, nitriles and their derivatives, quarternary nitrogen bases and miscellaneous cationic surfacants.**c) Non-ionic surfactants:** Polyethenoxy ethers and esters and polyhydroxy nonionicsurfactants, Alkylol amides.

The norms relating to internal assessment in each paper shall be as under :-

1) Home assignment - 5 Marks
2) Seminar - 5 Marks
3) Group discussion - 5 Marks
4) Library Work/Analysis of Research Papers - 5 Marks

Total - 20 Marks

Books suggested :

1. Schmid G. (Ed.), ñNanoparticles: From Theory to Applicationò, Wiley-VCH, Weinheim,2004
2. Rodriguez J.A. and Fernandez-Garcia M., (Ed.), ñSynthesis, Properties and Applications of Oxide Nanomaterialsò, John Wiley, New York.,2006
3. Klabunde K.J., (Ed.), ñNanoscale Materials in Chemistryò, Wiley-Interscience, NY,2001
4. Rao C.N.R., Müller A. and Cheetham A.K., (Ed.), ñThe Chemistry of Nanomaterials: Synthesis, Properties and Applicationsò, (Volumes 1 and 2), Wiley-VCH Verlag, Weinheim,2004
5. R.S.Drago, ñPhysical Methods in Inorganic Chemistryò, 3rd ed., Wiley EasternCompany(Units I, II, III & IV).
6. R.S.Drago, ñPhysical Methods in Chemistryò, W.B.Saunders Company,Philadelphia,London
7. W.Kemp, ñNMR in Chemistry ï A Multinuclear Introductionò, McMillan, 1986.
8. C.D.Becker, ñHigh Resolution NMR ï Theory andApplicationsò, Academic Press,2ed.,(1980).
9. B.P.Straughan and S,Walker ñSpectroscopy Vol. Iò, Chapman and Hall (1976).
10. RM Silverstein, CG Bassler and TC Morril, Spectroscopic Identification of Organic Compounds, 4th Edition, John Wiley & Sons, New York, 1981.
11. Donald L Pavia, Gary M Lampman and George S Kriz, Introduction to Spectroscopy, 3rd Edition, Saunders Golden Sunburst Series.
12. CN Banwell and Elaine M McCash, Fundamentals of Molecular Spectroscopy, 4th Edition.
13. Raymond Chang, Basic Principals of Spectroscopy, RE Krieger Publishing Co., Huntington, New York, 1978
14. An Introduction to Medicinal Chemistry, Fifth Edition, Graham L. Patrick, Oxford University Press
15. Drug-like Properties: Concepts, Structure Design and Methods, Edward H. Kerns and Li Di, Elsevier, 2008
16. Medicinal Chemistry, Ashutosh Kar, New Age International Publishers, Fourth Edition
17. Supramolecular Chemistry by J. W. Steed & J. L. Atwood, 2ndEdn John Wiley, 2009.
18. Crystal Engineering. The Design of Organic Solids by G.R. Desiraju, Elsevier, 1989.
19. J. M. Lehn, Supramolecular Chemistry, VCH, Weinheim, 1995.
20. Rosen M.J., ñSurface and Interfacial phenomenaò, John Wiley & Sons, N.Y
21. Moody G.J. and Thomas J.D., ñSelective Ion Sensitive Electrodesò, Merrow Publishing Company Ltd., Watford, England.
22. Gregg, S.J. and Sing, K.S.W., ñAdsorption, Surface Area and Porosityò, 2nd Ed., Academic Press
23. Adamson, A.W., ñPhysical Chemistry of Surfacesò, 5th Ed., John Wiley & Sons.

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Semester – I
Paper-II

RECENT TRENDS IN BOTANY

Duration of paper : 3 Hrs. **Theory Total Marks-80**

Internal Assessment Total Marks – 20

Course Objectives:

- To understand the current system of plant classification and recent developments in plant systematics and biodiversity conservation strategies.
- To know the recent development and mechanism in Plant physiology related to Photosynthesis, Respiration, Signal transduction and plant hormones.
- To inspire students make them creative and groom them with the emergence of knowledge in the areas of Cell Biology, Genetics and Applied Plant Breeding systems.
- To understand the principles and operations of various basic instruments, reagents and stain preparations and safety measures in research.
- To acquire knowledge about fungal biotechnology, Plant pathology with related to agriculture sector.

Course outcomes:

- Acquire the update knowledge of current plant classification system, Molecular taxonomy, biodiversity of India and plant authentication and analysis through websites.
- Understanding the recent aspect of research in photosynthesis, respiration, signal transduction and senescence and new plant hormones.
- Understanding of biological basics and cell cycle research, recent karyotype concept, genetics problems, tools and techniques of breeding methods.
- Use the techniques, skills and modern engineering tools necessary for gene regulation, Molecular mechanism in *Arabidopsis*, Plant biotechnology and its application through tissue culture.
- Principle and operation of basic instruments, reagent and stains preparation and safety measures.
- update knowledge of plant pathogenic fungi and AM fungal biotechnology in agriculture.

Unit I: (16 Marks)

Plant classifications: Need and importance of taxonomy, Recent system of classification: Angiosperm Phylogenetic Group (APG) System. Molecular Taxonomy: Status, Techniques and applications of Molecular systematics, Phylogeny: origin and recent theory of evolution of angiosperm. Biodiversity of India. RET species.**Taxonomic structure:** Plant collection and specimen preparation, Hebarium techniques. **Modern Trends in Plant taxonomy:** External morphology in relation to taxonomy, vegetative and floral anatomy in relation to taxonomy, Palynology in relation to taxonomy, Embryology in relation to Taxonomy, Cytotaxonomy, Serotaxonomy. Chemotaxomy. Numerical Taxonomy, Use of computer databases for identification of plants with the help of website, GIS and GPS.

Unit II: (16 Marks)

Physiology: Recent developments in Photosynthesis, Respiration and Photorespiration- an overview; Signal transduction- receptors - phytochrome, ABA, G-proteins and Phosphate signaling cyclic nucleotides. Calcium, Protein kinases. Senescence and Programmed Cell Death. PCD in life cycles of plants. New plant Hormones- Brassinosteroids, Kassikins (Smoke detectors) Genes involved in biotic and abiotic stresses, water stress and temperature stress.

Unit III: (16 Marks)

Cell Biology, Genetics, Plant breeding: Cell division regulation-Recent developments in cell cycle research. Construction of Cytological and Molecular Maps. Banding Karyotype. Problems on Linkage and Crossing Over. Breeding Methods: Introduction and Acclimatization, Hybridization. Mutation Breeding. Nuclease-mediated site directed mutagenesis. Cytoplasmic male sterile lines. Radio isotopic tracer techniques in Biology.

Unit IV: (16 Marks)

Plant Molecular Biology and Biotechnology: Gene structure, function and development. Molecular mechanism of leaf and flower development in *Arabidopsis.* Regulation of genes involved in Photosynthesis and nitrogen fixation. Biology and Genetics of *Agrobacterium tumefaciens*. **Plant Biotechnology:** In-vitro culture techniques; Plasticity and totipotency, Culture types ï callus, cell suspension culture, Protoplast, Root culture, Shoot tip and Meristem culture, Embryo culture, Microspore culture. Plant regeneration. Somatic embryogenesis, Organogenesis; Applications of tissue culture in plant breeding, floriculture and Forestry; Industrial Applications of Tissue culture for secondary metabolite production, Role and types of Elicitors (Biotic and Abiotic)

Unit V: (16 Marks)

Bio techniques: Laboratory rules and safety: Hazard and Risks, Warning labels (Signs) for specific chemical hazards. Chemical, Physical and Biological hazards and safety measures. Solution mixtures and media: Normal, Molar and Molal solutions. Preparation of Buffer solutions for DNA, RNA and Protein. Stock solution and Serial dilutions. Chemical fixatives, Stains, other useful reagents and mounting media. Calibration of pH meter.

Applied Mycology and Plant Pathology: Mycorrhizae (AM): Applications of mycorrhiza in agriculture. Fungal biodiversity; Fungi in biotechnology; Fungi in Genetic Research; Endophytic fungi and their importance; Fungal interactions and practical exploitation; Major groups of plant pathogenic fungi. Host specialized necrotrophic pathogens; Mycorrhizae (VAM) and significance. Plant disease diagnosis and diagnostics; Molecular biology of Plant-Microbe interaction; R-genes and R gene mediated disease resistance.

The norms relating to internal assessment in each paper shall be as under :-

1)	Home assignment	- 5 Marks
2)	Seminar	- 5 Marks
3)	Group discussion	- 5 Marks
4)	Library Work/Analysis of Research Papers	- 5 Marks
	Total -	20 Marks

Reference books:

1. Arbuscular Mycorrhizal Fungi. Praveen Gehlot and Joginder Singh. academia.edu.
2. Dany Spencer Adams, 2004. Lab Maths. I.K. International Pvt. Ltd. ISBN: 81- 88237-04-3.
3. Dipak Kr kar, Soma Halder, 2006. Plant Breeding and Biometry. NCBA ISBN: 81-7381-519-4.
4. E books, Journals and recent literature related to the topic available on Internet.
5. Gardner, Simmons and Snustad, 1991. Principle of Genetics (Eighth ed.). John Wiley & Sons. ISBN: 0- 471-50487-4.
6. Genes and Agriculture by M.J.Chrispeels and D.F.Sadava (1994)., Jones and Bartlett.
7. James D. Watson, Baker, Bell, Gann, Levine, Losik, 2009. Molecular Biology of Gene (Fifth ed.). Pearson. ISBN: 978 - 81-7758-181-2.
8. James Watson, 2008. Molecular Biology of the Gene, 5th LPE edition, Person Publications
9. Jane Roskams & Linda Rodgers, 2004. Lab Ref. I.K. International Pvt. Ltd. ISBN: 81-88237-05-1.
10. Judd, W.S., Campbell, C.S., Kollogg, E.A., Stevens, P.F. and Donoghue M.J.2008. Plant systematic: phylogenetic approach. Sircuier Associates, Inc.
11. K. Ghosh, S. Mukherjee,S. Mukherj, (3rd edition) Plant Physiology. New Central Book Agency. Kolkata. ISBN 81-7381-478-3.
12. Karp, G. Cell and Molecular Biology - 6th Edition, J Wiley & Sons.
13. Mycorrhizal Fungi: Use in Sustaiable Agriculture and Land Restoration. Zakaria M. Solaman, Lynette K. Abbott, Ajit Verma (ed.). Springer.
14. Plant Biochemistry & Molecular Biology by P.J.Lea & R.C.Leegood (1993) John Wiley and Sons. Plants,
15. Principles of Gene Manipulation. An Introduction to Genetic Engineering. R.W. Old, S.B.Primrose Fifth Edition, Blackwell Science Publications (2004).
16. Ray Samit and A.K.Ray, (ed.) 2006. Biodiversity and Biotechnology. New Central Book Agency (p.) Ltd. Kolkata; India.
17. Sharma O.P. 2009. Plant Taxonomy (second ed). Tata McGraw-Hill Private Limited. New Delhi. ISBN- 13:978-0-07-014159-9.
18. Singh Gurucharan, 2010. Plant systematic: An Integrated approach. Science publisher. USA.

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Semester – I
Paper-II
Recent trends in Zoology

Duration of paper : 3 Hrs. **Theory Total Marks-80**
Internal Assessment Total Marks - 20

Course Objectives :

The students are provided with

1. Knowledge on conservation of biodiversity.
2. Stem cell technology for human welfare.
3. Knowledge on Immuno biology
4. Information on Bioenergetics and Detoxification.
5. Knowledge in cell Biology.

Course outcomes:

- The knowledge on biodiversity, ethics and its conservation strategies.
- Stem cell technology and their applications in human welfare.
- Acquaintance in immuno-techniques and its wide exposure in molecular diagnostics.
- An exposure to Bioenergetics and Detoxification.
- Knowledge on signal transduction pathways, cell cycle , biology of aging and cancer

UNIT I : CELL BIOLOGY **(16 Marks)**

C**ell Signaling**: Various paths of signal transduction, Activation of gene transcription by G-Protein coupled receptor, JAK & STAT Pathway.

Cell Cycle: Cyclin and Cyclin- dependent Kinases (CDK), regulation of CDK cyclin activity, role of MPF, DNA replication block and its removal, Check point and feedback control.

Biology of Aging: Primary aging ,Secondary aging, hypothesis of aging, free radical damage and DNA mutation, role of Mt-DNA in aging, genetic clock , limits of cell division in aging , hormonal imbalance, cell starvation, effect of aging on the body systems.

Biology of Cancer: Genetic theories of cancer, Oncogenes, Different type of tumor viruses, Carcinogens, Cancer prone hereditary diseases, lymphoma, Anti cancer therapy.

UNIT II: IMMUNOLOGY **(16 Marks)**

Cells of immune system & their function, Innate & Acquired immunity, B cell and humoral response, Antigens, Epitopes, Adjuvants, Antibodies types & functions, complement system, cytokines & their biological roles, types of vaccines, Autoimmunity & autoimmune diseases, hypersensivity reactions, monoclonal antibodies.

UNIT III: **(16 Marks)**

BIOENERGETICS AND DETOXIFICATION

Bioenergetics- Cytochromes, redox potential and free energy, Electron transport system, P:O ratio, Inhibitors of ETS, Mitochondrial shuttle system, Oxidative phosphorylation, coupled reactions, group transfer, biological energy transducers- ATP,ADP and Pi , Inhibitors, uncouplers.

Detoxification- Mechanism, oxidation-reduction, hydrolysis, conjugation, detoxification of drugs, cytochrome P450.

Free radicals : Formation, advantages and disadvantages.

UNIT IV: **(16 Marks)**

STEM CELL BIOLOGY

Properties and types of Stem cell & Stem cell markerôs, Stem cell disorders, Repairing the nervous system with stem cells, Stem cell and cardiac repair, Stem cell and regeneration, Stem cell cultures and Flow cytometry, Ethical issues associated with stem cells.

UNIT V: **(16 Marks)**

CONSERVATION BIOLOGY

Present status of wildlife in India, Modern tools and techniques to asses biodiversity, Biodiversity and their threats, Ethics and values of conservation, Types of conservation- in situ & ex situ, endemic species, IUCN role in conservation, Concept of endangered species, Conservation strategies and hotspots in India.

The norms relating to internal assessment in each paper shall be as under :-

1)	Home assignment	- 5 Marks
2)	Seminar	- 5 Marks
3)	Group discussion	- 5 Marks
4)	Library Work/Analysis of Research Papers	- 5 Marks

	Total -	20 Marks

REFERENCES:

1. Lehninger,Nelson and Cox, Principles of Biochemistry, 4th Edition, W.H. Freeman and Company,2004
2. Voet and Voet, Fundamentals of Biochemistry , Upgrade Edition, Wiley 2002
3. Lubert Stryer, Biochemistry, 4th Edition, W.H. Freeman and Company, 1995
4. Mathew Vanholde, Biochemistry.
5. Bain, Thermodyanemics for Biological systems.
6. Essentials of Conservations- Richards B. Primacks
7. An introduction to conservation biology- Anna sher & Richard B. Primack
8. Conservation Biology- Kamaljit Bawa, Richard B. Primack
9. Hand book of wild life law enforcement in India- Samir sinha
10. Endangered Animals of India & their conservation- S.M. Nair (National Book Trust of India).
11. Geral mcarp- Cell & Molecular Biology 8th edition,Willey.
12. Leninger A.L.

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Appendix-C
Semester-I
PAPER – III

Applications of Information and Communication Technology (I.C.T) In The Relevant Field

Duration of paper : 3 Hrs. **Theory Total Marks-80**

Internal Assessment Total Marks - 20

Course Objectives :

1. To understand basic functioning of Introduction Communication Technology.
2. To understand the tools of Information and Communication Technology.
3. To understand basic concepts of Networks and Network Security.

Course Outcomes :

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

Identify various components of a computer system.

1. Describe the main functions of a operating system (OS) and explain the history leading to their current form
2. Create, edit, save, format and print documents to include documents with lists and tables and with other applications related to processing
3. Create and format spreadsheets and presentation tools with adding multimedia and other operations related to it.
4. Use various web tools including Web Browsers, E-mail clients, search utilities and also understand its security related features.

Syllabus :

Unit I Computer and its Components : **(16 Marks)**

Introduction, Hardware and Software, Computers Characteristics, Generations of Computers, Types of computers: Supercomputers, Mainframes, Personal computers, Note book computers, Categories of Computers, Applications of Computers, Input Ÿ Process Ÿ Output (IPO), Computer Ports & Cables, Number System.

Unit II Operating System: Introduction : **(16 Marks)**

Definition of Operating Systems, Operating System Functions, Operating System Concerns, Operating System Types, Algorithm, Flowchart, Installing Windows, Basic Operations in Windows, Interface, Introduction to Windows File System, Storing and Managing Data, Windows User Accounts, System Settings, Adjusting the Computers Settings, Introduction to Hadoop.

Unit III Word Processing Software : **(16 Marks)**

Introduction to MS Office, Word Processing with MS-Word: basic operations- Editing, Proofing, and Formatting text, paragraphs and pages, working with tables and images, Mail merge, working with Charts, Equations, and Symbols.

Unit IV MS Excel & Presentation Software : (16 Marks)

Introduction to MS Excel and its User Interface, Working with workbooks & work sheets, Data Entry techniques, Table, Setting, Print related operations, Performing Calculations on Data: Working with Excel Formulas, Functions and Charts, Sorting/ Filtering data. MS PowerPoint: Presentation Basics, Adding more components to the slides, Formatting Presentations, backgrounds and layout, Applying Themes, Using Slide Master, Working with Multimedia, Printing slides and Delivering Presentations. Introduction to R tool.

Unit V Introduction to Network & Network Security : (16 Marks)

The Internet: An introduction, Meaning and benefits of the Internet, The history of the Internet, Differences between Internet and World Wide Web, Connecting to the Internet, Web Browsers, User Interfaces of Web Browsers, Browser Customization, Search Engines, E-mails. Network Security: Introduction, Basic Terminology, Attacks, Cyber Crimes.

The norms relating to internal assessment in each paper shall be as under :-

1) Home assignment - 5 Marks
2) Seminar - 5 Marks
3) Group discussion - 5 Marks
4) Library Work/Analysis of Research Papers - 5 Marks

Total - 20 Marks

Reference Books :

1. Leon. A & Leon.M, ñFundamentals of Information Technology: Second Editionò, Vikas Publishing.
2. Williams Sawyer, ñUsing Information Technology: A Practical Introduction to Computer & Communicationsò 6th International Edition, McGraw Hill.

Online Links :

1.ebooks.lpude.in/library_and_info_sciences/BLIS/year_1/DLIS108_INFORMATION_AND_COMMUNICATION_TECHNOLOGY_APPLICATIONS.pdf

2. https://www.itu.int/en/ITU-D/ICT-Applications/Pages/default.aspx

Appendix-D

Syllabi of M.Phil.(One Year Full Time Degree Course) (Semester Pattern) in the Faculty of Science & Technology (Science Group)
Semester – I
Paper-IV

Review of Literature / Field work

Review of Literature and or Field work -80 Marks
Internal Assessment ï 20 Marks

Students shall undertake the Review of Literature and or Field work as prescribed by the RAC under the guidance of the supervisor. The supervisor shall evaluate the same and submit the marks/ credit to the University through research centre.

The norms relating to internal assessment in each paper shall be as under :-

5) Home assignment - 5 Marks
6) Seminar - 5 Marks
7) Group discussion - 5 Marks
8) Library Work/Analysis of Research Papers - 5 Marks

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Appendix-E

Syllabi of M.Phil (One Year Full Time Degree Course) (Semester Pattern)in the Faculty of Science & Technology (Science Group) inthe subjectsChemistry & Mathematics

Semester – II

Dissertation

S. N.	Name of Paper	Credits	Examination Scheme			Min.Passing Marks
			Dissertation	Internal Assessment	Total Marks	
1	Dissertation	24	400	--	400	200

The distribution of marks as per different assessment parameters shall be as under :-

1) Seminar on Review of Literature - 25
2) Synopsis of Dissertation - 25
3) Representation & predefence of draft Dissertation - 50
4) Evaluation of Dissertation - 200
5) Viva-Voce - 100

Securing at least 50% marks in each assessment parameter shall be mandatory.

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Syllabi of M.Phil (One Year Full Time Degree Course) (Semester Pattern)in the Faculty of Science & Technology (Science Group) inthe subjectsPhysics, Statistics and Zoology

Semester – II

Dissertation

S.N.	Name of Paper	Credits	Examination Scheme			Min.Passing Marks
			Dissertation	Internal Assessment	Total Marks	
1	Dissertation	24	400	--	400	200

The distribution of marks as per different assessment parameters shall be as under :-

1) Seminar on Review of Literature - 50
2) Synopsis of Dissertation - 25
3) Representation & predefence of draft Dissertation - 75
4) Evaluation of Dissertation - 200
5) Viva-Voce - 50

Securing at least 50% marks in each assessment parameter shall be mandatory.

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Syllabi of M.Phil (One Year Full Time Degree Course)
(Semester Pattern)in the Faculty of Science & Technology (Science Group)
inthe subjectBotany
Semester – II
Dissertation

S.N.	Name of Paper	Credits	Examination Scheme			Min.Passing Marks
			Dissertation	Internal Assessment	Total Marks	
1	Dissertation	24	400	--	400	200

The distribution of marks as per different assessment parameters shall be as under :-

1) Seminar on Review of Literature - 50
2) Synopsis of Dissertation - 50
3) Representation & predefence of draft Dissertation - 50
4) Evaluation of Dissertation - 200
5) Viva-Voce - 50

Securing at least 50% marks in each assessment parameter shall be mandatory.

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