SAKTHI COLLEGE OF ARTS AND SCIENCE FOR WOMEN, ODDANCHATRAM

(Recognized Under Section 2(f) and 12(B) of UGC Act 1956)

(Affiliated to Mother Teresa Women's University, Kodaikanal)

PG AND RESEARCH DEPARTMENT OF CHEMISTRY

CURRICULUM FRAMEWORK AND SYLLABUS FOR OUTCOME BASED EDUCATION IN

M.Phil., CHEMISTRY

FRAMED BY

MOTHER TERESA WOMEN'S UNIVERSITY,

KODAIKANAL

UNDER

CHOICE BASED CREDIT SYSTEM

2018 - 2021

REGULATIONS

Eligibility:

A candidate with postgraduate degree in Commerce, International Business, Business Administration, Bank Management or any related discipline with minimum of 55% marks.

Duration:

One year

Medium of Instruction:

English only

Examinations:

The M.Phil, program in commerce comprises of Theory courses (3 in the 1st Semester and 1 in the 2nd Semester) and one Dissertation cum Viva – Voce. Paper I, II, III and IV are common for all the candidates.

Attendance:

- Normally a student must secure a minimum of 80% attendance to become eligible to take the End – Semester Examination (ESE) in a course. However, condonation of shortage of attendance may be granted on genuine medical grounds upto a maximum of 10% of the contact days. For this purpose, the student must, immediately upon returning to class after the period of illness, apply for the condonation, submitting valid medical certificate (s) from registered medical practitioner (s) through his/her advisor to the Head of the Department (HOD), who will decide upon the application for condonation of shortage of attendance. Medical certificates submitted on the eve of the ESE will not be accepted.
- If a student who has no genuine medical grounds and has earned 70% or more but less than 80% of attendance in a course in a semester that student will be debarred from the ESE in that course in that course in that semester. However the student may take the ESE when offered in later semester.
- If a student has earned less than 70% attendance, that student will be debarred from the ESE in the course and the statement of grades will read IA (Inadequate Attendance) against that course. Such a student must repeat that course when offered in a later semester. Attendance in a course will always be reckoned from the days of joining the course to the last day of the course.

Redoing of the Programme

A student who has been debarred from the ESE for lack of attendance must repeat the course at the later semester, paying the prescribed fees for the course. No student will be permitted to repeat a course or reappear for a CIA test or an ESE for improvement of Grade Points. A student, who has fulfilled all the course requirements but has not been able to take the ESE alone, can take the same at a later semester. A student who has failed in an ESE need take only the ESE in that course when it is next offered. Such students need take only the fee for ESE of the course.

Students interested in redoing of course(s) have to get prior official permission for the same by applying to the Registrar through the HOD on before 5th June (of redoing of old semester courses) or 5th November (for redoing Even Semester Courses) every year.

A student may be permitted to break his/her study on valid grounds. Such break of study is entertained only if the student has completed at least two semesters of student. For availing break of study, the student has to apply to the Registrar along with the recommendations of the Class Advisor and the HOD in the format prescribed enclosing documentary evidences(s) as a proof for his/her claim for break of study and after paying prescribed fee. Unauthorized break of study will not be permitted under any circumstance. Break of study will be permitted subject to the formalities of readmission as well as the availability of courses to be completed and the examination norms.

Assessment:

Assessment of the students will be two-fold consisting of Continuous Internal Assessment (CIA) and End Semester Examination (ESE). The ratio between CIA and ESE will normally be 40:60.

Continuous Internal Assessment (CIA)

The CIA marks shall be awarded based on the following:	Marks
Scores of Best two tests out of three tests	20
Assignment	10
Seminar/Quiz	10
Total	**40**

End Semester Examination (ESE):

Except in the case of Project-work Summer Placement Training and exclusively practical/ field placement courses, the ESE will consist of a written examination of three hours duration reckoned for a maximum 60 marks.

Part-A (5*12=60)

5 Questions out of 10

Time extension for submission of Dissertation:

Extension for submission of dissertation shall be granted as per the University norms and conditions.

Passing Minimum Marks:

There will be no minimum for internal assessment in papers I, II, and III. A candidate will be declared to have passed in a course if she gets a minimum of 50% marks in the University examination and 50% marks in total, putting together the continuous internal assessment marks and University examination marks in that course. A candidate should have secured 50% in Dissertation and Viva-Voce to get a pass.

Classification of Candidates

If a candidate secured 60% and above in both the parts put together, she is deemed to have passed in First Class.

If a candidate secured 50% and above but less that 60% in both the parts put together, she is deemed to have passed in Second Class.

If a candidate secures less than 50% in both the parts put together, she is deemed to have failed in the course.

Failed Candidates:

A candidate who fails in any course/courses may appear again in those course/courses as per University rules.

Completion of the program:

The students have to complete their program within 3 years from the completion of the duration of program, failing which their registration will stand automatically cancelled and they have to register afresh, if they want to pursue the program.

Award of degree:

A student will be declared to be eligible for the award of a degree if she has:

- Registered for and undergone all the courses under the different parts of the curriculum of her program.
- No dues to the University, hostel, NSS, Library, Clubs, Associations etc., and
- No disciplinary action pending against her.

Other regulations:

Besides the above, the common regulations of the University shall also be applicable to this program.

******

PREAMBLE:

The objective of any programme at Higher Education Institute is to prepare their students for the society at large. Sakthi College of Arts and Science envisions all its programmes in the best interest of its students. With this vision, the Department of Chemistry has been incepted with the introduction of B.Sc., (Chemistry) in 2009. Comprehending the need of its learners for higher studies, the institution introduced M.Sc., (Chemistry) in 2010 and M.Phil., (Chemistry) in 2014.

M.Sc., (Chemistry) is a post graduation course, which will allow the students to develop in depth understanding of various aspects of the subject. The conceptual understanding, development of experimental skills, designing and implementation of novel synthetic methods, developing the aptitude for academic and professional skills, acquiring basic concepts for structural elucidation with hyphenated techniques, understanding the fundamental biological processes and rationale towards computer assisted drug designing are among such important aspects.

Fixing the Learning Objectives:

Since the Academic year 2018 – 2019, the learning objectives and outcomes of the programmes B.Sc., (Chemistry), M.Sc., (Chemistry) and M.Phil., (Chemistry) have been set, following the Bloom's Taxonomy Cognitive Domain. Accordingly, it is broken into six levels of learning objectives of each course. They are -

K1 / Knowledge = Remember

K2 / Comprehension = Understand

K3 / Application = Apply

K4 / Analysis = Analyze

K5 / Evaluation = Evaluate

K6 / Synthesis = Create

Mapping COs with POs:

For each programme, the Educational objectives and the Specific objectives are specified. The programme outcomes are designed according to the curriculum, teaching, learning and evaluation process. For each course, the definite outcomes are set, giving challenge to the cognitive domain. The course outcomes are mapped with the programme outcomes. The performance of the stakeholders is assessed and the attainment rate is fixed, by using the measurements 'high', 'medium' and 'low'. The restructuring of the curriculum is done based on the rate of attainment.

Institutional Objectives:

The institution has certain definite Institutional Objectives to be attained.

- Skill Development & Capacity Building
- Women Empowerment
- Self-reliance
- Gender Equity & Integrity

Programme Specific Objectives:

The Post Graduates of M.Sc. Chemistry Programme will be able to

- **PEO1:** Apply chemical principles and theories and acquire skills in synthesis, instrumentation and characterization.
- **PEO2:** Apply laboratory skills and critical thinking to develop applications for solving Industry oriented problems.
- **PEO3:** Function as a team member and develop projects in a multi-disciplinary environment by emulating leadership skills.
- **PEO4:** Work productively as chemistry professional by adopting to environment with lifelong learning and adhering to ethical standards and apply the knowledge acquired for the improvement of the society.

Mapping PEOs with IOs:

Programme Educational Objectives	**Institutional Objectives**			
B.Sc., M.Sc., and M.Phil., (Chemistry)	**1**	**2**	**3**	**4**
PEO1: Applying chemical principles and theories and acquire skills in synthesis, instrumentation and characterization.	*****			
PEO2: Applying laboratory skills and critical thinking to develop applications for solving Industry oriented problems.		*****		
PEO3: Functioning as a team member and develop projects in a multi-disciplinary environment by emulating leadership skills.			*****	
PEO4: Working productively as chemistry professional by adopting to environment with lifelong learning and adhering to ethical standards and apply the knowledge acquired for the improvement of the society.				*****

Measuring: H – High; M – Medium; L – Low

PROGRAMME OUTCOMES: (POs)

After completion of the course, certain outcomes are expected from the scholars.

- **PO1:** Comprehending the advanced theories, the concepts and applications of chemistry.
- **PO2:** Applying the knowledge of important laboratory techniques, methods, and instrumentation.
- **PO3:** Performing a literature search, extract useful information to develop research methodology.
- **PO4:** Designing and executing new chemical experiments with a high degree of sophistications, good laboratory practice and proper handling of chemicals to successfully complete an advanced research project.
- **PO5:** Identifying and analyzing the scientific problems and successfully carry out experiments, as well as analyzing and interpreting data to arrive scientific results.
- **PO6:** Integrating knowledge from each of these areas with critical thinking skills in order to become problem solvers.
- **PO7:** Gaining an understanding of professional responsibility and ethics in Chemistry.

COMMON STRUCTURE / M.Phil., (CHEMISTRY) / 2018 - 2021

Sem	Sub. Code	Title of the Course	HRS	CREDITS	CIA	CE	Total
I	MCHT11	Research Methodology	6	4	40	60	100
	MCHT12	Advances in Chemistry	6	4	40	60	100
	MPST13	Professional skills	6	4	40	60	100
II	MCHA21	Area Paper	6	4	40	60	100
	MCHD21	Dissertation and Viva-voce		14			200
	Total			**30**			**600**

For each course other than the Dissertation

Continuous Internal Assessment : 40 Marks

End Semester Examination : 60 Marks

Total : 100 Marks

Question Pattern:

Answer any Five Questions (5 x 12 = 60)

Question 1 (or) Question 2 → Unit 1

Question 3 (or) Question 4 → Unit 2

Question 5 (or) Question 6 → Unit 3

Question 7 (or) Question 8 → Unit 4

Question 9 (or) Question 10 → Unit 5

SEMESTER I

PAPER I

MCHT11 RESEARCH METHODOLOGY 6 hours /4 credits

Objectives

- To introduce the purpose and importance of research
- To impart knowledge in the various methods of research.
- To learn the scientific method of collecting data and to compute statistical parameters to arrive at meaningful conclusions.
- To know the methodology of writing thesis and journal articles.

Course Outcomes:

On completion of the Programme, certain Outcomes are expected from the learners.

Description	Blooms' Taxonomy Level
Gaining knowledge in applying critical tools and research methodology	Knowledge (Level K1)
Identifying the needs for Research	Comprehension (Level 2)
Becoming well versed in the mechanics of thesis writing.	Application and Analysis (Level K3 and Level K4)
Applying the correct methodology in research writing.	Application (Level 3)
Developing skills to locate, evaluate, and incorporate relevant source	Synthesis (Level 6)

Unit I

Philosophy of Science and literature survey

Literature survey – Sources of information – Primary, Secondary, Tertiary sources – Chemical Journals – Journal abbreviations. Chemical abstracts – Subject Index, Author Index, Formula Index and other Indices with examples. Dictionary of Compounds – Beilsteins and other hand books

Web resources – E-Journal – Citation index – Impact factor – H-Index – E-Consortium – UGC infonet – E-Books – Search engines: Scirus, Google Scholar, Chem Industry, Wiki – Databases: Chem Spider, Science Direct, SciFinder, Scopus

Unit II

Methodology of Scientific Document Writing

Introduction to technical writing-types of report, title and abstract, the text-style and conventions in writing. Writing dissertation and thesis – Title, Abstract, Introduction, Literature Review, Experimental Methods, Results and Discussion, Foot notes, Figures, Data Presentation, Tables, Sign Conventions followed – Conclusions and Recommendations – Bibliography.

Preparation of manuscript and posters – writing review article and book reviews – preparing research proposals for grants – ethics in scientific publication – formats for some national and international journals.

Unit III

Data Analysis

True value - standard value - observed value – Error – Types of Errors – Accuracy – Precision, Error Analysis, Minimization of Errors, Deviation from Accurate Results - the Binomial Distribution – the Gaussian Distribution – Mean - - Median – Deviation – from Mean and Median – student's t-test, F-test – Significant figures in multiplication – Division – Addition and Subtraction – Curve Fitting method of Least Squares – Linear Regression – Multiple Linear Regression – Slope – Intercept and Correlation Coefficient

Unit IV

Good Laboratory Practices and safety

Introduction: History, definition, principles, Good laboratory practices (GLP) and its application. GLP training: Resources, Rules, Characterization, Documentation, quality assurance, Resources, Facilities: building and equipment, Personnel, GLP and FDA, Stepwise implementation of GLP and compliance monitoring.

Safe working procedure and protective environment, protective apparel, emergency procedure and first aid, laboratory ventilation, Safe storage and use of hazardous chemicals, procedure for working with substances that pose hazards, flammable or explosive hazards, procedures for working with gases at pressures above or below atmospheric – safe storage and disposal of waste chemicals, recovery, recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, incineration and transportation of hazardous chemicals.

Unit V

Analytical techniques and Nanochemistry

The principle, instrumentation and applications of TGA/ DTA/DSC, SEM &TEM, AAS techniques.

Nanochemistry

Basic idea of nanochemistry - Defining nanoassemblies - Simple methods of preparation of nanomaterials - Techniques for the characterization of nanomaterials - AFM and SEM - Important applications of nanomaterials.

Fullerenes – carbon nanotubes - biomaterial-functionalized nanoparticles.

References

1. R. L. Dominoswki, Research Methods, Prentice Hall, 1981.
2. 2. J. W.Best, Research in Education, 4th ed. Prentice Hall of India, New Delhi, 1981.
3. M. Coghill and L. R. Gardson, The ACS Style Guide – Effective Communication of Scientific information, 3rd Edn, Oxford University Press, 2006.
4. H. Beall and J. Trimbur, A short Guide to Writing about Chemistry, 2nd Edn, Longman, 2001.
5. J. Anderson, B.H. Durston and M.Poole, "Thesis and Assignment Writing", John Wiley, Sydney 1970.
6. R. Berry, "How to Write a Research Paper", Pergamon, Oxford, 1986.
7. Ralph Berry, "The Research Project: How to Write It", 4th Ed., Routledge, Taylor and Francis, London, 2000.
8. W.G. Campbell – "Form and Style in thesis Writing, Houghton Mifflin Co., Boston M.A, 1970.
9. S. P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 1993.
10. D. Brynn Hibbert and J. Justin Gooding, Data Analysis, Oxford University Press, New York, 2006.
11. C. R. Kothari, Research Methodolgy, Methods and Techniques, Wiley Eastern Ltd, New Delhi, 1991.
12. Handbook Good Laboratory Practice (GLP) Quality Practices for Regulated Non-Clinical Research and Development
13. Willa Y. Garner, Maureen S. Barge, and James. P, Good Laboratory Practice Standards: Applications for Field and Laboratory Studies (ACS Professional Reference Book)
14. Chemical safety matters-IUPAC –IPCS, Cambridge Univ. Press, 1992.

15. G. D.Christian & J. E. O'Reily, Instrumental Analysis, 2nd Ed., Allyn & Balon, 1986.
16. H. H. Willard, L. L. Merritt, J. A. Dean and F. A. Settle, Instrumental Methods of analysis, 7th ed., CBS publishers, New Delhi,1986.
17. D. A. Skoog, F. J. Holler and T.M. Niemann, Principles of Instrumental Analysis, 5th Ed., Harcourt Asia Pvt. Lts.,2001
18. Srivastava, Chemical Analysis: An instrumental Approach, S. Chand, New Delhi
19. F. A. Settle,Ed. Handbook of Instrumental Technique for Analytical Chemistry, Pearson Edn., India,1997.
20. C. N. R. Rao, A. Muller, A. cheethan, Eds. The chemistry of Nanomaterials, Wiley, New York, 2004.
21. D. L. Feldheim, C. A. Fross, Jr. Metal Nanoparticles: Synthesis, Characterisation and Applications; Dekker; New York, 2002.
22. G.L.Hornyak, J.Dutta, H.F.Tibbals, A.K.Rao, Introduction to Nanoscience, CRC Press, 2008.

Paper II

MCHT12 ADVANCES IN CHEMISTRY 6 hours /4 credits

Objectives

- To impart knowledge and understanding in the advanced concepts of organic chemistry
- To impart knowledge and understanding in the advanced concepts of inorganic chemistry
- To impart knowledge and understanding in the advanced concepts of physical chemistry
- To impart research aptitude and provide adequate training in synthesis, characterization, instrumentation

Course Outcomes:

On completion of the Programme, certain Outcomes are expected from the learners.

Description	Blooms' Taxonomy Level
Gaining knowledge of advanced concepts of physical, organic and inorganic chemistry	Knowledge (Level K1)
Identifying the twelve principles of green chemistry	Comprehension (Level 2)
Applying and analyzing the basic principles of Fluorescence Spectroscopy	Application and Analysis (Level K3 and Level K4)
Getting familiarity with the physical and structural methods of Chemistry	Synthesis (Level 6)

COURSE CONTENT

Unit I

Advanced Organic Chemistry

Organic Synthesis - Synthetic planning, Retrosynthetic analysis and disconnection method, Functional group protection.

Asymmetric Synthesis - Basic principles, Asymmetric synthesis using chiral reagents, Asymmetric catalysis, catalytic asymmetric alkylation, hydrogenation, reactions catalysed by enzymes and other proteins. Organo transition metal chemistry-Applications to asymmetric synthesis.

Green Chemistry –Twelve principles of green chemistry - Green chemical methods of synthesis-use of microwaves in organic synthesis - solventless reactions - green solvents - supercritical fluids for extraction - ionic liquids

Unit II

Advanced Physical Chemistry

Electrochemical Techniques

Principles of polarization techniques, Principles of voltammetry, cyclic voltammetry.

Fluorescence Spectroscopy - characteristics-fluorescence anisotrophy - resonance energy transfer-steady state and time resolved fluorescence – molecular information from florescence – new fluorescence technologies - multi photon excitation - florescence correlation spectroscopy-single molecular detection.

Unit III

Advanced Inorganic Chemistry

Spectral and Magnetic properties of complexes: Electronic spectra of metal complexes, selection rules, term symbols, correlation diagrams - electronic spectra of d^n ions, Magnetic susceptibility, application of magnetic moments to structure elucidation of metal complexes.

Medicinal Inorganic Chemistry: Contrast enhancing agents for medical diagnostics, theory of MRI imaging, Gd based contrast agents-synthesis and structural features; optical contrast agents-Ag and AuNPs. Metal complexes for radiotherapy, diagnostic radiopharmaceuticals. Applications of organometallics in medicine and industries

Unit IV

Spectroscopy I

Nuclear Magetic Resonance Spectroscopy

^{1}H NMR spectroscopy: Chemical shift – number of signals – peak areas – multiplicity – geminal, vicinal and long – range couplings – factors affecting these parameters

^{13}CNMR spectroscopy: Broadband of off-resonance decoupling, comparison of ^{1}H and ^{13}CNMR – factors affecting intensity of signals – chemical shifts - γ - gauche effect

2D NMR: NOESY and COSY, application of ^{1}H NMR & ^{13}C NMR in structure elucidation

Mass spectroscopy - basic principles – molecular ion peak, parent peak, fragments, metastable peak, iosotope peaks – determination of molecular weight and molecular fragment – fragment pattern of simple organic molecules – McLafforty rearrangement

Unit V

Spectroscopy II

ESR spectroscopy – Basic concepts- Factors affecting the magnitude of g and A tensors in metal complexes – Anisotropy in g and A values - Zero-field splitting and Kramers degeneracy -

Applications of EPR to Cu(II), Fe(II), Mn(II) and Ni(II) complexes.

Combined spectroscopy problems involving IR, UV, Mass and NMR.

Reference Books

1. R.E.Ireland, Organic Synthesis, Prentice Hall, 1969.
2. S.Turner, Design of Organic Synthesis, Elsevier, 1976.
3. S.Warren, Designing Organic Synthesis – A programmed introduction to synthon approach, Wiley, New York, 1978.
4. R.T. Morrison and R.N. Boyd, Organic Chemistry, 6th Ed., Pearson, 1992.
5. J.March, Advanced Organic Chemistry, 4th Edn. John Wiley, New York,1992
6. Joseph R.Lakowicz "Principle of Fluorescence Spectroscopy" Third Edn. Springer,USA,2006
7. Sharme, S. G. Schulman, Introduction to Fluorescence Spectroscopy, John Wiley & Sons, Inc., New York, 1999.
8. H. Kissinger, Electroanalytical Techniques, John Wiley, 1998
9. J.E. Huheey, Inorganic Chemistry, 3rd. Ed., Harper & Row publisher, 1983.
10. D.E. Douglas, D.H. McDaniel, J.J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed. 1994.
11. J.D. Lee, Concise Inorganic Chemistry, 5th Ed, Wiley, 1999.
12. E.A.V. Ebsworth, Structural Methods in Inorganic Chemistry, 3rd Ed., ELBS, 1987
13. C E Coates. M L H Green, P Powell K Wade Principles of Organometallic Compounds, Chapman and Hall, 1977.
14. M. F. Purcell, J. C. Kotz, Inorganic Chemistry, Saunder, 1977.
15. P.M. Silverstein, F.X. Wester, Spectroscopic Identification of Organic Compounds, 6th Ed., Wiley 1998.
16. Mohan, Organic Spectroscopy Principles and Applications, 2nd Ed., CRC, 2004.
17. Kemp, Organic Spectroscopy, 3rd Ed., MacMillon, 1994.
18. L. Pavia, G.M. Lampman, G.S. Kriz, Introduction to Spectroscopy, 3rd Ed., Brooks Cole, 2000.
19. E.A.V. Ebsworth, Structural Methods in Inorganic Chemistry, 3rd Ed., ELBS, 1987.
20. R.S. Drago, Physical Methods in Inorganic Chemistry, 3rd Ed., Wiley Eastern Company
21. R.S. Drago, Physical Methods in Chemistry, W. B. Saunders Company, 1992.

22. J.E. Huheey, Inorganic Chemistry, 3rd. Ed., Harper & Row publisher, 1983.
23. D.E. Douglas, D.H. McDaniel, J.J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed. 1994.
24. P.M. Silverstein, F.X. Wester, Spectroscopic Identification of Organic Compounds, 6th Ed., Wiley 1998.

MPST13 - PROFESSIONAL SKILLS (Common Paper)

Hours 6/ Credits 4

Course Outcomes:

After completing the course, certain outcomes are expected from the learners.

Description of COs	Bloom's Taxonomy Level
Acquiring knowledge of communication skills with special reference to its elements, types, development and styles.	Knowledge (Level 1)
Understanding the terms like Communication technology, Computer Mediated Teaching	Comprehension (Level 2)
Developing skills in ICT and applying them in teaching, learning contexts and research.	Synthesis (Level 6)
Developing Multimedia/E-contents in their respective subjects.	Synthesis (Level 6)
Integrating Technology into Teaching and Learning	Synthesis (Level 6)

COURSE CONTENT

Unit I - Computer Application Skills

Fundamentals of Computers and windows, Operating System – MS – Office Components; Word: Equation editor, Table Manipulation – Formatting Features – organizational Chart. MS – EXCEL: Statistical Functions – Number Manipulation – Chart Preparation with various types of graphs. MS Powerpoint: Powerpoint presentation with multimedia features. Internet and its applications: E-mail and attachments – working with search engines.

Unit II - Communication Skills (English/Tamil/Both)

English: Skills of Communication: Listening, Speaking, reading and Writing – Writing Synopsis, Abstract and proposals. Developing good language asbilities – Public speaking – Writing Skills.

Tamil: பயிற்றுவிக்கும் திறன் - பேச்சுத்திறன் - வெளிப்பாட்டுத் திறன் - ஆய்வுத்திட்டம் - ஆய்வுச்சுருக்கம் தயாரித்தல்.

Unit III - Communication technology

Computer Mediated Teaching: Multimedia, E – Content, Satellite Based Communication – EDUSAT and ETV channels. Web: Internet I Education.

Unit IV - Pedagogical Skills

Micro teaching Skills: Skill of Induction, Skill of Stimulus Variation. Skill of Explaining, Skill of Probing Questions, Skill of Blackboard, Writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills – Research Extension and Consultancy.

Unit V - Industrial Technology

Lecture Techniques: Steps, Planning of a lecture, Lecture Notes, Updating, Delivery of Lecture. Teaching – Learning Techniques: Team teaching, Group Discussion. Seminar, Workshops, Symposium and Panel Discussion – Games and Simulations – Web Based Instructions.

References

- Micael D. and William (2000). Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hasll, New York.
- Information and Communication Technology in Education: A Curriuculum for Schools and Programme of Teacher development. Jonathan Anderson
- Pandey S.K.(2005). Teaching communication. Commonwealth publisher, Delhi
- Sharma. R.A.(2006), Fundamentals of education technology, Surya publication, Meerut
- Kum Babu A. and Dandapani S. (2006), Microteaching, Neelkamal Publications, Hyderabad
- Vanaja M and Rajasekhar S. (2006), Computer Education, Neelkamal Publications, Hyderabad

DISSERTATION AND VIVA VOCE

(14 Credits)

By the end of program duration a Dissertation is to be presented by each student. The Dissertation must exhibit knowledge and skills of formulating research objectives and hypotheses, designing of good research tools, collecting relevant data, analyzing and interpreting the data, writing a lucid and purposeful report.

For this purpose each research student will be placed under the guidance of a faculty member. The dissertation together with the Viva Voce carries 14 credits. The dissertation is to be assessed separately by the guide-cum-supervisor and an external examiner. The Dissertation carries 200 marks. The Viva-Voce is conducted for only for those who get minimum 50% pass marks in the Dissertation by a Board of Examiners consisting of Guide and HOD/Senior Professor in the department. A minimum of 50% is needed for a pass.