Course of Study

Meta University Concept based Course

M. Sc. (Mathematics Education)

A joint degree postgraduate program by
University of Delhi & Jamia Millia Islamia

Scheme of study and examination

Cluster Innovation Centre
University of Delhi

INDEX

Meta University Concept based Course

M. Sc. (Mathematics Education)

Partners: University of Delhi & Jamia Millia Islamia
Administration: Cluster Innovation Centre (CIC), University of Delhi

Philosophy: The Meta University concept marks a paradigm shift in Higher Education in India. It is based on the premise that the 'Whole is Greater than the Sum of the Parts'. By drawing upon the established excellence of the partners, the Meta University concept can utilize, exploit and create synergy between programmes, activities and institutions. It shall serve as a platform for communication, collaboration and co-operation that will optimize scarce resources as well as free students from the tyranny of boundaries and the constraints of location. Using India's growing IT tools, the Meta University concept combines the best in traditional systems with the new opportunities for knowledge enhancement. The programme will bring benefits to all stakeholders with its expected outcomes:

- New programmes
- Flexible platforms
- Wide reach - transcends the tyranny of geography & tradition
- Greater inter and trans-disciplinarity
- Higher level of co-operation & collaboration between institutions
- Unleashing new ideas
- Innovation for problem solving

Key Ingredients of the Meta University model:

- Creates a new paradigm in knowledge systems
- Reliance on National Knowledge Network
- Pooling of resources by different institutions
- Creation of synergies in innovative programmes
- Use of information technology for virtual learning
- Innovation in knowledge acquisition
- Combining "Collaborative learning" and "Trans-disciplinary learning"
- Mentor to serve as the Catalyst

Objectives of the course M.Sc.(Mathematics Education):

- To move away from the conventional pedagogy of teaching mathematics especially at school level and to include methods of facilitating learning such as storytelling, projects, group work and participative learning.
- To use technology as significant aid in learning.
- To impart knowledge of some basic concepts and principles of the discipline.
- To establish inter-disciplinarity between mathematics and other subjects from Humanities and the Social Sciences.
- To encourage collaborative learning through group activities and hands-on learning.
- To provide in-service training for school teachers.
- To learn to apply mathematics to real life situations and help in problem solving.

Methodology:
Under the concept of Meta University, M.Sc. (Mathematics Education) is a joint degree two year postgraduate programme jointly offered by University of Delhi and Jamia Millia Islamia. Cluster Innovation Centre (CIC), University of Delhi, administratively manages the program. The program aims to give the students some theoretical inputs and substantial hands-on experience in knowledge-making. The Degree course reflects a transdisciplinary approach and will promote fresh viewpoints, making the learning and teaching process joyful and productive.
Teaching may adopt several platforms including class room, virtual and project based learning. Interactive methods of instruction will be encouraged. Students will take combinations of courses at both Jamia Millia Islamia and at the University of Delhi. Courses available on-line or part time will also be permitted.
Hands on learning, integrating school internships and innovation projects will be given vital importance. Mentors shall play key role in group project work. Mentors will be carefully selected for their expertise in the relevant areas. They may be from both within the partner institutions and outside.

Eligibility criteria:
Graduate degree in any discipline provided the applicant has done at least two full-fledged papers in mathematics at the undergraduate level.

Admission Procedures:
Admission will be through Entrance Test (85% weightage) followed by interview (15% weightage) of shortlisted candidates (4 times of the number of seats).

Number of Seats:
Twenty (20) with following distribution of seats:
University of Delhi: 10
Jamia Millia Islamia: 10

Reservation Policy:
Number of seats shall be reserved as per rules of the two institutions, wherever the student is admitted.

Per Semester Fee:
To be determined mutually by partner universities i.e. University of Delhi and Jamia Millia Islamia. Presently fee is Rs.5000/- per semester.

Evaluation
- For projects, testing methodology will include group testing.
- Transfer of grades/credits between Jamia Millia Islamia and University of Delhi.

Mentorship
Project work/ Practicum will be closely supervised by faculty of DU/JMI and Mentors who may be from outside the host institutions.

Examination and result:

The examination for papers studied by students at JMI will be conducted at JMI. *

The examination for papers studied by students at DU will be conducted at DU.

Declaration of semester-wise result and issuing of Mark-sheets carrying logo of both DU and JMI shall be the responsibility of Examination Branch University of Delhi.

* JMI examination branch will provide result of these papers to DU.

Elaborated examination scheme is given later in this document.

Joint Degree of DU & JMI:

On successful completion of the program, joint degree will be awarded to students enrolled in Meta University concept course M.Sc. (Mathematics Education). The joint degree shall carry the logo and signatures of competent authorities of both DU & JMI. The degree shall be in three languages: English, Hindi and Urdu.

Coordination Committee for M. Sc. (Mathematics Education):

As per UGC guidelines, there shall be a coordination committee constituted by participating universities for each Program.

The participating universities shall be responsible for deciding

(a) Duration of Programme
(b) Number of course required for the programme
(c) Fee structure for the program
(d) Number of students in the programme
(e) Infrastructure requirements
(f) (i) Framing syllabus
    (ii) Number of Lectures and associated activities for the course
    (iii) Number of credits for the course
    (iv) Evaluation procedure
(g) Any other related matter

The Coordination Committee shall ensure timely decision on the above issues and other related issues.

The composition of the Coordination Committee for Meta University concept program of DU & JMI namely M. Sc. (Mathematic Education) shall be:

1. The Director, Cluster Innovation Centre, DU **(Chairman)**
2. The Joint Director, Cluster Innovation Centre, DU (member)
3. Coordinator, Meta University Program, DU (**Member Secretary**)
4. Three nominated members from field of Education/Mathematics Education/ Mathematics/Media, DU (Members) (To be nominated by the Vice Chancellor, DU on the recommendation of the Director, Cluster Innovation Centre, DU)
5. Coordinator, Meta University Program, JMI*
6. Three nominated members* from field of Education/Mathematics Education/ Mathematics/Media, JMI (Members) (To be nominated by the Vice Chancellor, JMI)

   * One of the members from JMI will be designated as **Co-Chairman**.

Course Structure
M. Sc. (Mathematics Education)

Duration of the Course: Four Semester (Two years)
Each Semester: 16 weeks
I Credit: 16 hrs of Theory/ Guided Projects
Total No. of Credits to be acquired for the course: 96

SEMESTER I				
S. No.	Paper Title	Offering Centre	Credits	Maximum Marks
I.1	Calculus: Role in real life	CIC,DU	5	150
I.2	Perspectives in Mathematics Education	CIC,DU	5	150
I.3	Paper option 1 from JMI*	AJKMCRC, JMI	3	100
I.4	Paper option 2 from JMI*	AJKMCRC, JMI	3	100
I.5	Innovation Project-I: Interlinking mathematics and real life problems	CIC,DU/JMI	8	200

SEMESTER II				
S. No.	Paper Title	Offering Centre	Credits	Maximum Marks
II.1	Demystifying the power of data: Probability & Statistics	CIC,DU	5	150
II.2	Curriculum and Evaluation in Mathematics	CIC,DU	5	150
II.3	ICT in Mathematics Education	CIC,DU	3	100
II.4	Learning ways of Mathematical writing	CIC,DU	3	100
II.5	Innovation Project: Internship in Educational setting-I	CIC,DU/JMI	8	200

SEMESTER III				
S. No.	Paper Title	Offering Centre	Credits	Maximum Marks
III.1	Discretizing and understanding Real Life Situations Through a Mathematical Lens	CIC,DU	5	150
III.2	Art of Teaching Mathematics	CIC,DU	5	150
III.3	Digital Technology in Mathematics Education	CIC,DU	3	100
III.4	Research Methodology in Education	CIC,DU	3	100
III.5	Innovation Project-III: Internship in Educational Setting-II	CIC,DU/JMI	8	200

SEMESTER IV				
S. No.	Paper Title	Offering Centre	Credits	Maximum Marks
IV.1	Understanding mathematical language of ordinary differential equations and complex analysis	CIC,DU	5	150
IV.2	Research Investigation in Mathematics Education	CIC,DU	5	150
IV.3	Paper option 3 from JMI*	AJKMCRC, JMI	3	100
IV.4	Paper option 4 from JMI*	AJKMCRC, JMI	3	100
IV.5	Innovation Project-IV: Research Dissertation	CIC,DU/JMI	8	200

* List of papers to be opted from JMI

1. English for Media Communication
2. Advertising
3. Contemporary India and the World We Live in
4. Development Journalism
5. Media Management
6. Public Relations and Corporate Communication
7. Media Laws and Ethics
8. Mass Communication Theory
9. Media Research

Note:

The decision to offer two or three specific papers from amongst the above-mentioned papers or any other course approved by Academic Council of JMI varies from semester to semester. Syllabus of the papers to be opted from JMI presently is as per approved syllabi of AJKMCRC.

Detailed Syllabus of papers to be studied at University of Delhi
M. Sc. (Mathematics Education)

SEMESTER-I

I.1 Calculus: Role in real life

Calculus is the most powerful tool in mathematics with widespread applications. The pedagogy of this paper is "think and then do". The paper builds up on the topics, namely limits and continuity, differentiation and integration and then move on to more advanced applications in real life problems.

Topics and Applications:

a. Continuous compounding of interest, finding the circumference of circle from an n polygon inscribed in it, calculating the value of pi through limits, understanding of the ideas of limits and continuity graphically, calculating limits at infinity, indeterminate forms, special limits involving exponential and logarithmic functions, asymptotes.
b. Improved facility in algebraic manipulation, graphing of quadric surfaces.
c. Comparing the graphs of a function, its first derivative and its second derivative, sketching curves, solving optimization problems, fluency in differentiation, concavity and inflexion points, how derivatives affect the shape of the graph.
d. Modeling average speed of traffic, temperature, population, etc., computing future value of a continuous income flow, flow of blood through an artery, fluency in integration, integration as a limit of a sum, volume of a frustum of a cone, cap of a sphere, volume of earth (not as a sphere but as an oblate spheroid).
e. Staggered start of a race, Gabriel's horn (finite volume but infinite surface area), parametric equations of curves, arc length and surface area.
f. Path of a projectile, Kepler's laws of planetary motion, and introduction of Vector valued functions, differentiation and integration of vector valued functions.
g. Derivation of Newtonian formula of kinetic energy from Einstein's special theory of relativity, modeling of a simple pendulum, understanding the ideas of sequences, infinite series including Taylor approximations.

h. Topographic maps, isothermal surfaces, functions of several variables, level curves and surfaces, limits and continuity of functions of two and three real variables, partial differentiation (two variables), partial derivative as a slope, partial derivative as a rate.

Reading list

- T. M. Apostol Calculus, Volumes 1 and 2, Wiley Eastern, 1980.
- Hughes-Hallett et al., Calculus - Single and Multivariable, John-Wiley and Sons, 2003.
- James Stewart, Calculus, , Thomson, 2003.
- G. B. Thomas and R. L. Finney, Calculus and Analytic Geometry, Addison-Wesley, 1998.

Internet Resources (viewed on 23 June 2014)

1. http://academicearth.org/subjects/mathematics/category: 107
2. http://academicearth.org/subjects/mathematics/category: 109
3. http://www.intmath.com/applications-differentiation/applications-of-differtiationsintro.php
4. http://www.math.scar.utoronto.ca/calculus/redbook/
5. http://www.analyzemath.com/calculus.html
6. http://web.monroecc.edu/calcNSF/
7. http://www.math.dartmouth.edu/~klbooksite/

I.2 Perspectives in Mathematics Education

Mathematics is a discipline of multiple perspectives. Mathematics helps us to understand and organize things around us. Mathematics influences every aspect of human life but the way mathematics is taught in schools does not reflect the necessity, utility and aesthetics in Mathematics teaching. The beauty of Mathematics lies in its simplicity and freedom. The field of Mathematics Education looks into the pertinent gap between Essence of Mathematics and Teaching of Mathematics.
The paper discusses the foundations of Mathematics and evolution of Mathematics Education in historical and socio-cultural perspectives.

a. Nature, Philosophy and Foundation of Mathematics

   Study of dual Nature of Mathematics: from cognitive to social, Principals of Mathematics, Pure vs Applied Mathematics, Paradoxes in Mathematics, Philosophy of Mathematics and Mathematics Education, History and culture of Mathematics

b. Philosophical, cultural, social, historical and psychological facets of Mathematics Education

Philosophy of Mathematics Education, Mathematics Education in Social and Political context, Mathematics as an intellectual property vs Mathematics as a humanistic discipline, History of Mathematics in and for the curriculum, Mathematics and symbolization, Mathematics in popular culture, knowing in Mathematics

c. Structuration in Mathematics: Axiom, Postulate, Mathematical Statement, Language, Theorem and Proof

Nature of mathematical ideas, Kinds of Mathematical statement, Mathematical Statements and proofs, Relation of Mathematics to logic, mathematical concepts and conceptual diversity, Primitive prepositions in Mathematics, Geometries and contradictions

d. Origin and development of Mathematical Ideas

Evolution of numbers, Quantity and measurement, birth of algebra, emergence of calculus and beyond; beyond numbers: set theory; Infinity, Infinitesimal and Continuity

e. School Mathematics in the changing world

School Mathematics as social classification, Issues of equality and excellence in school mathematics, Gender stereotypes in Mathematics, Mathematics for future vs Mathematics for appreciation, principles and Standards for school Mathematics, Mathematics literacy and Mathematics for all

Practicum: Open House discussion on Strands and Contemporary Issues in School Mathematics Education/ Review of one book from the reading list

Reading list:

- An Introduction to the History of Mathematics, Third Edition by Howard Eves, Publisher: Cengage Learning (1990)
- The Calculus Gallery, Masterpieces from Newton to Lebesgue by William Dunham (Princeton University Press) (2008)
- The Man Who Knew Infinity by Robert Kanigel, Little Brown Book Group (1992)
- What is Mathematics Really? By Reuben Hersh, Oxford University Press (1999)
- **The Foundations of Mathematics by Ian Stewart and David Tall,** Oxford University Press (1977)
- Does God Play Dice? By Ian Stewart, Blackwell Publishing (1989)
- A Concise History of Mathematics by By Dirk Jan Struik, Courier Dover Publications (1987)
- Universal History Of Numbers by Georges Ifrah, John Wiley & Sons (2000)

- Mathematics: New Golden Age by Keith Devlin.Mathematics: The Science of Patterns By Keith Devlin, Scientific American Library (1997)
- Guillen, M. (1983). *Bridges to Infinity: The Human Side of Mathematics*. Boston: Houghton Mifflin.
- A Mathematician's Apology by G.H. Hardy The Mathematical Experience by Philip J. Davis & Reuben Hersh, Cambridge University Press (2004)
- Bell E. T. (1940) : The Development of Mathematics, New York, McGraw Hill.
- Burton, David M (1985): The History of Mathematics Boston, Allyn and Bacon.
- Wilder R. K. (1952) : Foundations of Mathematics, New York, John Wiley and Sons.
- Courant R., Robbins H. (1963): What is Mathematics? Oxford University Press.
- Iglewiez, Boris and Stoyle, Judith (1973): An Introduction to Mathematical Reasoning, New York : The MacMillan Co.
- Polya, G. (1957): How to solve it, Garden City, New York: Dobleday.
- Polya, G. (1962), Mathematics Discovery, Vol. I & II, New York, John Wiley and Sons.
- John-Steiner V. & Mahn H.(1996). Socio Cultural Approaches to Learning and Development: A Vygotskian Framework. Educational Psychologist
- Azzouni J. (2006) How and Why Mathematics Is Unique as a Social Practice in Reuben Hersh (eds.) 18 Unconventional Essays on the Nature of mathematics. Springer Science, Inc.

I.3 PAPER OPTION 1 FROM JAMIA MILLIA ISLAMIA *

*Detailed syllabus of this paper is given later in this document.

I.4 PAPER OPTION 2 FROM JAMIA MILLIA ISLAMIA *

*Detailed syllabus of this paper is given later in this document.

I.5 INNOVATION PROJECT-I: INTERLINKING MATHEMATICS AND REAL LIFE PROBLEMS

Students need to identify and work on real time problems that can be solved through mathematical modeling and problem solving.

Innovation projects shall be carried out under the guidance of a mentor/mentors.

SEMESTER-II

II.1 Demystifying the power of data: Probability & Statistics

Uncertainty prevails in decision making, in testing compatibility of samples, and everywhere in day-to-day life. This paper aims to provide the basic understanding of the subject and the tools used to understand these uncertainties. The student will be able to fit, interpret, diagnose and predict simple real life models involving probability and statistics.

Topics and Applications:

- Sampling distributions, hypothesis testing, interval estimation, likelihood, analysis of categorical
- data, joint, marginal and conditional distributions, ANOVA and regression.
- Computer program R and its application to simple models.
- Statistical procedures and their implementation through the statistical package R, sampling
- distributions and randomness, likelihood analysis, bivariate, marginal and conditional
- distributions, curve fitting, linear regression, test statistic and their significance.

Reading List

- B. Bowker and G.J. Liberman, Engineering Statistics, Asia, 1972.
- R.V. Hogg and E.A. Tanis, Probability and Statistical Inference, Macmilan, 1983.
- N.L. Johnson and F.C. Xeen Leone, Statistics and Experimental Design in Engineering and the Physical Sciences, Vol. I and II, , Wiley Inter science, 1977.

Internet Resources: (viewed on 23 June 2014)

1. http://www.intuitor.com/statistics/
2. http://wiki.stat.ucla.edu/socr/index.php/Probability_and_statistics_EBook
3. http://www.ebook3000.com/A-Modern-Introduction-to-Probability-andStatistics_20862.html

II.2 Curriculum and Evaluation in Mathematics

The broad aim of this course is to develop holistic understanding of "Education" as a developmental force and how the purpose of education conceptualizes the idea of curriculum selection and legitimization of formal curriculum content. It further facilitates the student 's understanding on social influences on the aims of education and its' impact on the curriculum planning and implementation with focus on school Mathematics Curriculum . The course focuses on understanding aims of teaching Mathematics as continuum from narrow aims to higher aims; organization of Mathematics Curriculum (in the light of latest NCF, Position Paper on Teaching of Mathematics with special focus on twin premises of learning mathematics and universalization of schooling)

- Perspectives in Curriculum with reference to society, power and knowledge selection

Analysis of curriculum as intent and as reality; curriculum as the reflection of educational ideas and aspirations to be operationalized; curriculum as means to provide experiences to realize educational proposal into practice, Analysis of assumptions: the nature of knowledge, the nature of the child and the nature of the society, Debate on selection of knowledge, Debate on competing conception of balance and development of individual needs and the needs of the society.

- Process of curriculum development

Analysis of models: 'Objective model' and Process model', approaches to curriculum development: Role of central and state governments of India, Centralized and de-centralized curriculum development, Evaluation of curriculum as a whole.

- Concept of a National Curriculum Framework vs National Curriculum

Concept of curriculum framework, Kinds of curriculum framework, Curriculum in a democratic setup, Curriculum to facilitate and respect diversity, Concept of a National Curriculum Framework rather than a National Curriculum to help establish uniformity of democratic and secular norms, with the flexibility of approach and local contextually

- Understanding aims of teaching mathematics as continuum from narrow aims to higher aims

Organization of Mathematics Curriculum (in the light of latest NCF, Position Paper on Teaching of Mathematics with special focus on twin premises of learning mathematics and universalization of schooling)
Practicum: Time line on development of reforms in Mathematics Education in India/ Comparative analysis of International Mathematics Curriculum

Reading List

- The Curriculum: Theory and Practice by A.K. Valley, Sage Publication (2009)
- Curriculum: From Theory to Practice by Wesley Null Rowman & Littlefield, Rowman & Littlefield Publishers (2011)
- Contemporary Issues in Curriculum (6th Edition) by Allan C. Ornstein , Edward F. Pajak, Stacey B. Ornstein , Published by Pearson (2014)
- Curriculum Change and Innovation (2012) Shirley S. Y. Yeung, John T. S Lam, Anthony W. L. Leung and Yiu Chun Lo Hong Kong University Press
- Mathematics Curriculum in School Education (2014) by **Li**, Yeping, Lappan**,** Glenda (Eds.)Springer Publishers
- Perspectives on the Design and Development of School Mathematics Curricula Paperback –(2007) by National Council of Teachers of Mathematics
- Mathematics Curriculum: Issues, Trends, and Future Directions (Seventy-second Yearbook,2010) by Barbara J. Reys, Robert E. Reys Rheta Rubenstein, Published by NCTM

- Critical Issues in Mathematics Education Edited by: Paul Ernest, Brian Greer, Bharath Sriraman, Information Age Publishing (2009)
- A Decade of Middle School Mathematics Curriculum Implementation Lessons Learned from the Show-Me Project (2008) Edited by Margaret R. Meyer, University of Wisconsin–Madison and Cynthia W. Langrall, Illinois State University

II.3 ICT in Mathematics Education

Technology has changed the course of education. Effective use of technology can do a lot to benefit learners. The paper focuses on developing appropriate understanding, well coordinate and sound pedagogical knowledge to make judicious uses of technological tools for teaching mathematics beyond boundaries.

a. Potentials of ICT in Mathematics Education

ICT as a change agent, Place and purpose of technology in the curriculum, Means of ICT, technology embedded pedagogy

b. ICT for enhanced learning

Content planning using ICT, Role of ICT in content differentiation, ICT and self-paced learning, Use of ICT in inclusive classroom

c. Safety issues in use of ICT

Technology in the hands of teacher and student, connectivity through ICT on campus and off campus, learning space, e-content versus authentic information

Reading List

- Introduction to Information and Communication Technology in Education (2005) E-book by David Moursund , Teacher Education, University of Oregon
- ICT in Primary Education: Analytical survey(2012) by UNESCO
- Research on e-Learning and ICT in Education(2012) by **Jimoyiannis**, Athanassios (Ed.), published by Springer
- ICT: Changing Education (2001) by Chris Abbott, Psychology Press
- Technology, Innovation, and Educational Change: A Global Perspective: A Report of the Second Information Technology in Education Study, Module 2 (2003) by **Robert B. Kozma published by International Society for Technology in Education**
- Teaching Secondary Mathematics with ICT (2004) by,Sue Johnston-Wilder, David Pimm, McGraw-Hill International
- Teaching Mathematics Using ICT 3rd Edition (2010) by Adrian Oldknow Ron Taylor Linda Tetlow , published by Continuum International Publishing Group

II.4 Learning ways of Mathematical Writing

Mathematics is a sophisticated language written with lots of precision and accuracy. It follows certain rules which need to be followed by people who would like to write good mathematical content. The paper focuses on the art of mathematical writing to enable students to write quality content that is conceptually and pedagogically sound. The paper will focus on learning of software on mathematical writing.

a. Mathematics as a language and expression

Exploring mathematical ideas from language lens, features of mathematical language, evaluation of algebraic symbolism

b. Basics of Mathematical writing

Essential rules of mathematical writing, technical aspect of mathematical writing, adding creativity in mathematical content

c. Mathematical writing software

Writing on computer using software, namely, LateX, MathWriter,MathType

Practicum: Review and presentation through exemplary pieces of mathematical writing

Reading List

- Introduction to Mathematical Writing by Franco Vivaldi, School of Mathematical Sciences, The University of London, 2014
- Handbook of *Writing* for the *Mathematical* Sciences(1998) by Nicholas J. Higham, Published by The Society of Industrial and Applied Mathematics
- David K Pugalee, Writing, mathematics, and metacognition: Looking for connections through students' work in mathematical problem solving, *School Science and Mathematics*, May 2001.
- Donald E. Knuth, Tracy Larrabee, and Paul M. Roberts, *Mathematical writing*, Mathematical Association of America, 1989.
- Steven G. Krantz, *A primer of mathematical writing: being a disquistion on having your ideas recorded, typeset, published, read and appreciated*, American Mathematical Society, 1997.
- John Meier and Thomas Rishel, *Writing in the Teaching and Learning of Mathematics*, Mathematical Association of America, 1998.
- Candia Morgan, *Writing Mathematically : The Discourse of 'Investigation'* (Studies in Mathematics Education), Falmer Press, 1998.

II.5 INNOVATION PROJECT-II: INTERNSHIP IN EDUCATIONAL SETTING-I

This project will be carried out in schools as INTEGRATED SCHOOL INTERNSHIP PROJECT to experience mathematics teaching and learning, understanding classroom behavior and issues in assessments.

Innovation projects shall be carried out under the guidance of a mentor/mentors.

SEMESTER-III

III.1 Discretizing and Understanding Real Life Situations through Mathematical Lens

In modern world, most jobs involve interaction with computers. The computing and embedded systems technologies break additional barriers; even the day to day life and common activities now involve interacting with a computing device.

a. Graphs (bipartite, Euler, Hamiltonian, Planar)
b. Euler's V-E+F=2 Theorem, subdivisions, Kuratowski's Theorem,
c. matching, Hall's Marriage Theorem, assignment problems
d. counting sets, subsets, multisets, inclusion/exclusion, applications
e. Vectors and geometry
f. Systems of linear equations, echelon form, Gaussian elimination, linear independence.
g. Matrices, multiplication, transpose, inverses, linear maps. Intro to subspaces and bases. Rank.
h. Eigenvalues and eigenvectors. Determinants

Reading List:

- Linear Algebra and its Applications, D. C. Lay, Addison Wesley, 2005.
- A Modern Introduction, David Poole, Linear Algebra, Brooks Cole, 2011.
- Discrete and Combinatorial Mathematics, Ralph Grimaldi, International Edition, 2003.
- Discrete Mathematics and Its Applications, K. H. Rosen, McGraw-Hill, 2008

III.2 Art of Mathematics Teaching and Evaluation

The context of learning plays an important role to foster creativity, logic and concept building. The humanistic and realistic approach developed through the paper is rooted in belief that leaners construct the knowledge on their own in a stimulating environment. The role of teacher is to organize socially relevant and resourceful learning environment for active participation if learners. The paper emphasis on develop pedagogical and assessment paradigms to facilitate math learning for all.

a. Theories of Teaching and learning of Mathematics
   Styles and strategies for teaching mathematics, theories of learning (Dewey, Bruner, Piaget, Denies, Vygotsky) connecting theory and practice in mathematics teaching, facilitating culture of learning in mathematics classroom
b. Addressing Pedagogical Concerns in Mathematics classroom
   Critical content of school mathematics: Numbers, Algebra, Geometry, Probability and Statistics, Calculus, limits and continuity with emphasis on research in teaching and learning
c. Assessment for Active Mathematics learning
   Models of assessment, Assessment for learning and assessment of learning, assessment for teaching, Interpreting assessment, developing assessment plan for diverse learners
d. Mathematics across Curriculum
   Mathematics as a discipline of interdisciplinary approach, creative ways of developing mathematical ideas across curriculum
e. Resources for Mathematics Teacher
   Learning Mathematics through Minds on and Hands on, facilitating learning using active use of resources, developing innovative resources to develop mathematical ability (games, puzzles, models, hands on kits)

Practicum: Focused Discussion Forum to initiate dialogue and sharing on School Internship Experiences

Reading List

- Skemp R. (1987). The Psychology of Learning Mathematics. Lawrence E Hillsdale.
- Hiebert & Lefevre (1986). Conceptual and Procedural Knowledge in Mathematics: An Introductory Analysis by J. Hiebert (eds.) Conceptual and Procedural Knowledge: The case of mathematics. pp.1-27.
- Davis R. B. (1983). Complex Mathematical Cognition In H. P. Ginsburg (eds.) The Development of Mathematical Thinking. New York: Academic press. pp. 253-290.
- Resnick, L. B., & Ford, W. W. (1981). The Psychology of Mathematics for Instruction. NJ: Lawrence Erlbaum
- Cobb P. (1994). Where Is the Mind? Constructivist and Socio-cultural Perspectives on Mathematical Development. Educational Researcher, Vol. 23(7), pp. 13-20.

- Mitchelmore M. & White P.(2010) Teaching Mathematical Concepts: Instruction for Abstraction. Australian Catholic University National, Sidney Australia.
- John-Steiner V. & Mahn H.(1996). Socio Cultural Approaches to Learning and Development: A Vygotskian Framework. Educational Psychologist.
- Bell E. T. (1940) : The Development of Mathematics, New York, McGraw Hill.
- Black P., Harrison C., Lee C. Marshall B. Wiliam. D (2003): Assessment for Learning: Putting it into Practice, Open University Press
- Inside the Black Box: Raising Standards Through Classroom Assessment (2005) by Dylan Wiliam, Published by NFER Nelson

III.3 Digital Technology in Mathematics Education

Technology including multimedia is an asset to expand the reach of classroom teaching. The paper builds up pedagogical orientation to integrate use of digital technologies into mathematics classroom. The paper gives an opportunity to develop creative resources using available technology such as software & applets to foster critical thinking in mathematics learning.

a. ICT embedded Mathematics Pedagogy

Content specific mathematics pedagogies using digital resources, web-based innovations

b. Digital Technology in Mathematics Classroom

Designing web-based learning environment (web-site, blogs, virtual classroom etc)

c. Exploring Mathematics through online resources

Learning software for mathematics teaching and content design (CMAP, Geometer, Sketchpad, Geogebra, Graphing Calculator 3D,Captivate, Photoshop, Coral Design)

Practicum: Preparing E-content/E-resource/E-assessment/web-based classroom

Reading List

- The Mathematics Teacher in the Digital Era (Vol II) (2014) by Clark-Wilson, Alison, Robutti, Ornella, Sinclair, Nathalie (Eds.), Published by Springer
- Mathematics Education with Digital Technology (2011) by*:* Adrian Oldknow*, Published by Continuum*
- Research on e-Learning and ICT in Education (2012) by Jimoyiannis, Athanassios (Ed.), published by Springer

III.4 Research Methodology in Education

The paper focuses on idea of research in education and various research designs highlighting the quantitative and qualitative methods of data collection and data analysis. It also sensitizes students into the challenges of carrying out research in the field of education. Students are expected to do micro research project in educational setting to connect theory into practices.

a. Introduction to Educational Research

Research as source of inquiry, role of research in the field education, qualitative and quantitative paradigms of research, role of theory in research

b. Research Paradigms and Design

Research design in educational research, techniques in data collection and data analysis, relation between data collection, objectivity, reliability, validity and statistical inferences

c. Understanding Research Processes

Steps in carrying out research, research planning, writing proposal, review of literature, hypothesis, tools design, data collection and analysis, report writing

Practicum: Writing and defending a research proposal/ Micro research project

Reading list:

- Best J.W. (1999). Research in Education, New Delhi: Prentice Hall of India Pvt. Ltd.
- Reason, P. & Bradbury, H. (Eds) (2006). Handbook of action research: Concise paperback edition: Thousand Oaks, CA: Sage.
- Borg, W.R. and Gall, M.D. (1983). Educational Research – An Introduction, New York: Longman, Inc.
- Christensen, L. (2007). Experimental Methodology. Boston: Allyn & Bacon.
- Research Methods in Education (5th Edition)2000 by Louis Cohen ,Lawrence Manion ,Keith Morrison by RoutledgeFalmer
- Clive Opie (2004). Doing Educational Research- A Guide for First time researchers. New Delhi: Vistar Publications.
- Cohen,Manion & Morrison (2003) Research Methods in Education (V Edition) , Published by Taylor & Francis,
- Fraenkel, J.R., Wallen, N.E. (1996). How to Design and Evaluate Research in Education. New York: McGraw Hill.
- Stake, Robert E. (1995). The Art of Case Study Research. Thousand Oaks: C.A: Sage.
- Reason, P. & Bradbury, H. (Eds) (2006). Handbook of action research: Concise paperback edition: Thousand Oaks, CA: Sage.
- Sharma, S.R. (2003). Problems of Educational Research. New Delhi: Anmol Publications Pvt. Ltd.

III.5 INNOVATION PROJECT-III: INTERNSHIP IN EDUCATIONAL SETTING-II

This project will be carried out in schools as Advanced internship in schools or other educational institutes / organizations working actively in the area of mathematics education. It will be a focused internship in specialized areas.

Innovation projects shall be carried out under the guidance of a mentor/mentors

SEMESTER IV

IV.1 Understanding Mathematical language of Ordinary Differential Equations and Complex Analysis

Modeling is the process through which real life problems are converted to the mathematical language. This paper aims to develop techniques required to study the models involving differential equations. The methodology will be to first analyze and understand the problem, then write down the governing equations, solve them and then analyze the solution. The problems will be picked up from engineering, ecology, medicine, etc.

Topics and Applications:
Differential equations, solution by series expansion, analytic functions, contour integrals, Laurent series and residues.

1. Application of first order differential equation to draining a tank, harvesting of renewable natural resource, indoor temperature oscillation, flight trajectory, survivability with aids.
2. System of linear differential equations applied to mechanical systems, electrical network, drug assimilation into the blood, solution of a linear system (in non-degenerate cases) using eigen pairs.
3. Modeling two-axle automobile, earthquake induced vibrations of a multistory building, evaluation and application of matrix exponential (in non-degenerate cases)
4. Planar autonomous linear systems with graphical representation (in non-degenerate cases)
5. Planar non-linear system applied to ecological models, wildlife conservation preserve, mechanical systems, epidemic models, determination of stability and classification of equilibrium of a planar nonlinear system by linearization.
6. Complex numbers and their geometrical interpretation, polar forms, powers and roots.

Reading list:

- T. M. Apostol Calculus,, Volume 2, Wiley Eastern, 1980.
- W. E. Boyce and R. DiPrima, Elementary differential equations, John Wiley, 2005.
- C.H. Edwards and D.E. Penny, Differential equations and boundary value problems:
- Computing and modeling, Pearson education (Singapore), Pte. Ltd., 2005.
- E. Kreyszig, Advanced engineering mathematics, John Wiley, 1999.

Internet Resources: (viewed on 23 June 2014)

1. http://www.sosmath.com/diffeq/diffeq.html

2. http://serc.carleton.edu/sencer/ode_real_world/index.html

3. http://www.diptem.unige.it/patrone/differential_equations_intro.pdf

IV.2 Research Investigation in Mathematics Education

The paper highlights the significant features of mathematics education as a dynamic research field. It lays emphasis on developing critical understanding on issues and investigations in mathematics curriculum, pedagogy and assessment.

a. Trends and Issues in Mathematics Education Research
   Mathematics Educations as a dynamic field with growing input from research, place and purpose of mathematics education research, trends in mathematics education, ethical issues in mathematics education research
b. Interdisciplinary Research in Mathematics Education
   Exploring potential research area, research design in mathematics education: ethnographic research, historical research, case study research, statistical techniques: NPC analysis, correlation, multiple regression, analysis of variance, SPSS for data analysis
c. Dissertation Research
   Working and writing research report

Practicum: Research Colloquia

Reading List:

- Keith L (2013) Vital Directions for Mathematics Education Research, Published by Springer
- Clements, M.A.(Bishop, A., Keitel-Kreidt, C., Kilpatrick, J.,Leung (2013) Third International Handbook of Mathematics Education
- Lyn D (Ed) (2008): Handbook of International Research in Mathematics Education, Published

Journals and Periodical

- Journal for Research in Mathematics Education
- Journal of Research in Mathematics
- Mathematics Teaching
- School Science and Mathematics
- The Mathematics Matter

IV.3 PAPER OPTION 3 FROM JAMIA MILLIA ISLAMIA *

*Detailed syllabus of this paper is given later in this document.

IV.4 PAPER OPTION 4 FROM JAMIA MILLIA ISLAMIA *

*Detailed syllabus of this paper is given later in this document.

IV.5 INNOVATION PROJECT-IV: RESEARCH DISSERTATION

Each student will identify and work on a high priority research problem in mathematics education. The outcome shall lead to writing a research dissertation based on innovative research work.

Innovation projects shall be carried out under the guidance of a mentor/mentors.

DETAILED SYLLABUS AND LIST OF PAPER OPTIONS AVAILABLE FROM JAMIA MILLIA ISLAMIA FOR PAPERS I.3, I.4, IV.3 AND IV.4

1. English for Media Communication
2. Advertising
3. Contemporary India and the World We Live in
4. Development Journalism
5. Media Management
6. Public Relations and Corporate Communication
7. Media Laws and Ethics
8. Mass Communication Theory
9. Media Research

Each of the above courses from Jamia Millia Islamia is of 3 credits (3 hrs a week).
The decision to offer two or three specific papers from amongst the above-mentioned papers or any other course approved by Academic Council of JMI varies from semester to semester. Syllabus of the papers to be opted from JMI presently is as per approved syllabi of AJKMCRC.

English for media communication

Introduction:

Media communication entertains, educates, and provokes public debates. It is being practiced across different media outlets like newspapers, radio, and television. And in more recent times, the development in digital technology has led to a massive growth of on-line communication. This course introduces the student to a wide range of skills and disciplines associated with the use of English in mass communication.

Objectives:

- To enable students to improve their ability to compose mass communication texts, particularly with regard to grammar, vocabulary, spelling, punctuation, etc.
- to expose them to different types of mass communication texts with a view to analyzing rhetorical organization and stylistic features of mass communication discourse
- to enable them to try their hand at authoring and editing various types of mass communication texts

Course Description:

Unit 1

- Accuracy Development: Using real-life mass communication situations, students will work on aspects of grammatical accuracy, lexical accuracy, and speech accuracy (in developing speech accuracy the focus will be on correct English pronunciation: RP, the 'Received Pronunciation' – the BBC accent/ Standard Indian Pronunciation)

Unit 2

- Discourse Appreciation: To enable students to make a distinction between mass communication and interpersonal communication discourse, students will work with examples of such mass communication texts as editorials, features, articles, interviews, etc. with a view to analyzing their rhetorical organization and stylistic features (teaching materials to be culled from real-life mass communication texts)

Unit 3

- Reading Skills: Students will read selected passages drawn from real-life mass communication texts to monitor comprehension, to recognize methods of persuasion, to summarize, to draw conclusions, to make inferences, to analyze points of view, to identify main ideas, etc.

Unit 4

- Writing Skills: Students will be introduced to the notions of 'process' and 'product' in writing; they will then focus on learning skills of 'process writing' such as brainstorming for ideas, organizing ideas, writing the first draft, improving through drafts, and finalizing the copy etc.

Unit 5

- Authoring and Editing Mass Communication Texts: students will be required to write mass communication texts by using different input- sources like interviews (either face to face or by telephone); public addresses; press conferences; press releases; written documents, etc.; they will then be asked to edit these news texts for producing the final copy (teaching materials will be culled from real-life mass communication texts)

Suggested Readings:

1. Bell, Allen. The Language of News Media. Oxford: Blackwell.
2. Gration, G., J. Reilly and J. Titford. Communication and Media Studies. Basingstoke: Macmillan Education.
3. Mascull, B. Key words in the media. London: Collins Cobuild.
4. Brown, Gillian. Listening to Spoken English. London: Longman.
5. Hildyard, Jim. Spelling Matters. Oxford: Heinemann Educational Publishers.
6. Smee, Mark. Grammar Matters. Oxford: Heinemann Educational Publishers.
7. Corbett, Pie. Rachel Roberts. Grammar Success 4. Oxford: Heinemann Educational Publishers.
8. MacNab, Lindsay, Imelda Pilgrim, and Marian Slee. Skills in English 3R. Oxford: Heinemann Educational Publisher

Advertising

Introduction:

The potential of advertising was realized during the World War I when all sides used advertisements to mobilize people for the war. In the early twentieth century advertising moved out of the arena of print industry and quickly took advantage of the new mass media, using cinema and radio, to transmit commercial messages. The 1950s not only brought postwar affluence to the average citizen in the West but whole new glut of material goods for which, need had to be created. In America it quickly became the hottest consumer property. Till date, Advertising remains one of the strongest communication strategies. It has gained so much importance and influence that the 'commercial break' has now become an integral part of every television programme.

Objectives:

- To introduce the students to the creative, technical, ethical and managerial aspects of advertising and advertising industry.

Course Description

Unit 1

- Advertising as a communication technique: Evolution and Growth of Advertising, Scope of its messages. Advertising effectiveness.
- Different types of Advertising and Different mediums of Advertising.
- Advertising Agencies and the Hierarchy Structure, the Idea Pitching Techniques.
- In house and Out House Advertisement Productions, Advertising Campaigns.

Unit 2

- The Marketing Process and Advertising technique: The Communication Process and Objectives, The Dynamics of Marketing Communications and its Media.
- The Five Ps of marketing, Mega Marketing, Marketing Mix and The Competitive Triangle. Direct Marketing and Precision Marketing.

Unit 3

- The Product Life Cycle, Marketing Mix and Integrated Marketing Communications. Internal Marketing and retaining Customers.
- Laws and Ethics in Advertising, Social responsibility, Apex Bodies in Advertising and their code---ASCI, AAAI.
- Case Studies ---Analyzing the Ethical Aspects.

Unit 4

- The Promotion Mix: Promotion as an investment, The Promotion Mix decision, the push and pull Strategy.

- DAGMAR and the Conviction Model, AIDA Sequence, Promotion and Demand curve relation, The Media Weight Theory.

- Consumer Behavior---External and Internal factors.

- The Process of Advertising Creation—Situational Analysis, marketing plan and Advertising Plan, Advertising Feedback.

Unit 5

- The Brand: Concept and Management, Components of Brand: Strategy and Structure, Positioning, Image and personality.
- The Advertising Appeal: Language, sound, Graphics and Visuals.
- Campaign Planning and writing Briefs, Scripting for Ads.
- Case Study and Analysis of Various Advertisements and Brands.
- Market and advertising research: Types of Marketing Research, Pre Test, Post Test, Positioning research, and Psychographic Analysis

Suggested Readings:

1. Internet Advertising (Theory and Research) by David W. Schumann.
2. Law of Advertising, Broadcasting, Journalism and Public Relations by Michael G. Parkinson.
3. Radio Advertising: The Authoritative Handbook by NTC Business Books.
4. Practical Radio Promotions by Ted E.F. Roberts.
5. High Performance Selling by Ken Greenwood.
6. Selling Radio Direct by Michael C. Keith.
7. Positioning: The Battle for Your Mind by Al Ries.
8. The 22 Immutable Laws of Branding by Al Ries.
9. The 22 Immutable Laws of Marketing by Al Ries.
10. Marketing Warfare by Jack Trout and Al Ries.
11. The fall of Advertising and the Rise of PR by Laura Ries.
12. The Future of Advertising: New Media, New Clients, New Consumers in the Post Television Age by Joe Cappo.
13. The End of Advertising as We Know It by Sergio Zyman.
14. Life After 30 Second Spot: Energize Your Brand With a Bold Mix of Alternatives to Traditional Advertising by Joseph Jaffe.
15. Buzz Marketing: Get People to Talk About Your Stuff by Mark Hughes.
16. Connected Marketing: TV Viral, Buzz and Word of Mouth Revolution by Justin Kirby.
17. Online Marketing by Ravi Damani.

18. Web Copy that Sells: The Revolutionary Formula for Creating Killer Copy Every Time by M Veloso.
19. The New Marketing Manifesto: The 12 Rules for Building Successful Brands in the 21st Century by John Grant.
20. After Image: Mind Altering Marketing.
21. Truth, Lies, and Advertising: The Art of Account Planning by Jon Steel.
22. Behind the Scene in Advertising, Mark III: More Bull More.
23. Creative Advertising: Ideas and Techniques from the World's Best Campaigns by Mario Pricken.
24. Advertising Management: Batra, Aaker and Myers
25. Advertising and Promotion: Belch and Belch
26. The [Un]Common Sense of Advertising: Sanjay Tiwari
27. It Happened in India: Kishore Biyani
28. Consumer Behaviour and Marketing Strategies: Hawkins and Cooney.
29. Marketing Management, Philip Kotler, Kevin Lane Keller

Contemporary India and the World We Live In (Enrichment Paper)

Introduction:

Today the media is mainly obsessed with the news about politics and conflicts around the world. The reason is simple the majority of readers, listeners and viewers buy newspapers or turn to radio or television to know how the politicians running the affairs of the state? Or who is spilling whose blood for what? Unfortunately not only in India but elsewhere in the world too political, foreign and strategic affairs reporters are still considered to be more important than reporters working on other beats. Thus for every reporter, copy writer and editor it is essential to have the basic knowledge of those national and international issues which frequently debated and discussed in media.

Objectives:

- To introduce the students to the politics of Cold War period.
- To introduce the students to the politics of Post Cold War era.
- To introduce the students to the major national, regional and international conflicts.
- To introduce the students to the major national/regional and international organizations and bodies.
- To introduce the students to the foreign and economic policy of India.

Course Description:

Part-I

Contemporary International Scene:

Unit 1

- Unipolar World V/S Multi-polar World.
- East-West Conflict and the NATO Drive Towards Eastern Europe.
- Rise of Russia as Economic-Military Power.
- Major Conflicts: Arab-Israeli Conflict, Afghanistan, Iraq, Iran, Lebanon and North Korea.

Unit 2

- Militant Islam: Ideology, concept of Jihad and growing terrorism.
- North-South Divide: Aspirations of the developed as well developing nations.
- Conflict of civilization

Unit 3

- International Organizations: UN and its organs.
- International Financial Institutions: World Band, International Monetary Fund (IMF) and World Trade Organization (WTO).
- Regional cooperation; SAARC, ASEAN, EU, GCC and others.

Part-II

India's Foreign Policy:

Unit 1

- Conceptualization of Foreign Policy: Continuity and change, ambitions to emerge as a major power.
- India's conception of the UN in the context of its foreign policy objectives and its role in international politics.

Unit 2

- India's Economic diplomacy.
- India's Oil Security.
- Indo-Pak Conflict: Cross border Terrorism and the problem of Kashmir.
- Indo-US Nuclear Deal.

Note: Most of the topics mentioned above will be covered through classroom lectures but efforts will also be made to organize one-day seminars on selected topics.

Suggested Readings:

1. Discovery of India by Jawaharlal Nehru.
2. Wonder That Was India by A.L. Basham.
3. The Partition Omnibus With an Introduction by Mushirul Hasan (Oxford India Paperbacks)
4. India Wins Freedom by Maulana Abul Kalam Azad.
5. Introduction to the Constitution of India by Durga Daas Basu.
6. India's Foreign Policy and its Neighbors by J.N. Dikshit.
7. India and Regional Developments: Through the Prism of Indo-Pak Relations by J.N. Dikshit.

Development Journalism

Introduction

The development journalism module will open a completely different world for students as they discover some exciting possibilities of researching lesser known areas that are neglected by a lazy media. It will familiarize them with the realities of a changing India, developing India and how it is punctuated with anachronisms.

Objectives:

- Developing the Skills to analyze and report the socio economic developmental issues.
- Nourishing the communication skills required for Societal Empowerment.

Course Description:

Unit 1

- The reality of India
- Understanding Development Journalism: How it is dramatically changing in a changing India.
- How it has numerous new areas under it now as the umbrella of what is development grows.
- Challenges before a development journalist.

Unit 2

- Making Development Writing interesting and contemporary.
- How to get your publication interested in a development agenda.
- Tapping sources.
- Building a specialization
- Reporting on Environment, Health, Issues before Society
- Understanding the complex mosaic of India
- Updating yourself all the time.
- Understanding rural realities

Unit 3

- Children's issues
- Burning social issues like feticide, dowry, domestic violence, aging, problems of economic growth, etc.
- Gender issues
- Using all possible resources for research and learning
- How constant learning is the key to understanding complex issues in India.
- Understanding sociology and history to get a perspective.
- Staying positive to beat cynicism that envelops development reporters and writers.

Unit 4

- How to develop a mindset to do serious work of this nature all through life.
- Finding out unusual ideas
- Handling print, online and documentaries on development subjects.
- How to keep development writing serious and readable.
- Using modern writing techniques to beat boredom.
- Development of the idea and final execution
- Using statistics, graphs and pictures.
- Why it is important to bring in investigation and interpretation

Unit 5

Practical writing and reporting exercises on development subjects

Suggested readings:

1. Development Journalism: An Introduction by Dinesh C.Sharma.
2. Development Journalism, what next an agenda for the Press by D V R Murthy.
3. News With Third World perspective by Philip C.Horton
4. Social change by Steve Vago
5. World Development: Report-knowledge for Development . 1999: The World Bank

Media Management

Introduction:

Gone are the days when managing a newspaper or magazine, radio or a television station, was simple. Not very long ago editors were not only had the responsibility of bringing out a newspaper/magazine, or making editorial decisions in a radio or television channel but they were also responsible of administering the news organization in which they worked. Now the editors
have a rival in the form of 'media managers' who are not only responsible for the financial and administrative management of a media organization but also have a say in the editorial matters because editorial decisions have always a bearing on the circulation of a newspaper or the ratings of a television news channel.

Objectives:

To teach the students how to manage different news platforms from newspapers to web portals.

Course Description:

Unit 1

- Introduction to the course
- Media Management
- Principles of Media Management
- Media as an Industry and a Profession
- Preparing yourself for the Management
- Motivation and the work force
- Qualities of Leadership and Management
- Ownership Patterns of Mass Media
- Operations and Structure of News Media Company
- Organization Theory: Delegation, Decentralization, Motivation,
  Control and
- Coordination
- Hierarchy: Function and Organizational Structure of Different Departments.

Unit 2

- Business of Media: Discuss the way in which revenues and profits are achieved.
  Media regulation and possible "effects" of media on individuals and society
- Current Media Scenario including news portals
- Future Media Trends
- Policy Formulation: Planning and Control, Problems, Processes and Prospects of
- Launching Media Ventures
- General Management: Finance, Circulation, Sales Promotion
  (Including Pricing
- And Price War Aspect)

- Advertising and Marketing
- Apex Bodies: DAVP, INS and ABC

Unit 3

- Economics of Print and Electronic Media: Management, Business and
- Financial aspects of Media Management
- Media Budgeting and Finance Management, Budget Control
- Sales Management, Marketing and Market Analysis

Unit 4

- Advertising and Sales and Marketing Strategy
- Competition and Survival, Evolving a Strategy
- Media Planning and Buying
- TAM, INTAM, TRP, GRP and other media jargons
- PR for Building and Sustaining Business and Audience
- Integrated Marketing Communications: ATL and BTL
- Global Marketing Strategy
- Marketing and Research
- Market Survey Techniques

Unit 5

- Employee/Employer and Customer Relations Services: Marketing Strategies, Brand
- Promotion (Space/Time, Circulation), Reach, Promotion, ,
- Human Research Development for Media
- Foreign Equity in Indian Electronic and Print Media and Press Commissions on
- Indian Newspaper Management Structure.

Suggested Readings:

1. Media Management by Jan LeBlanc Wicks and Others.
2. Organizational Behavior by Linda K. Stroh and Others.
3. Human Resource Management by John Bratton and Jeffery Gold.
4. Electronic Media Management by Peter B. Orlik.
5. Staffing Organization by Robert E. Ploy Hart and Others.
6. The Practice of Management by Peter F. Drucker.
7. Radio-Television-Cable Management by James A. Brown, Ward L.Quaal.
8. Putting Total Quality Management to Work by Marshal Sashkin, Kenneth J. Kiser.
9. Daytime Television Programming by Marilyn J. Matelski.
10. Basic Radio Programming by Michael J. Langevin.
11. Motivation and Personality by Abraham Harold Maslow.
12. Creative Management by William Marsteller.

13. Selling Radio Direct by Michael C. Keith.
14. Financial Management by Coker Group, De Marco Associates.
15. Managing Organizations: Functions and Behaviors by Daniel F. Jennings and others.
16. Public Television for Sale: Media, the Market and the Public Sphere by William Hoynes.
17. Future Radio Programming: Cultivating Listenership in Digital Age.
18. Radio Programming: Tactics and Strategy by Eric Norberg.
19. Radio Operations: Management and Employee Perspectives by Lewis B. O'Donnell and Others.
20. Managing in a Time of Great Change by Peter F. Drucker.
21. Ratings Analysis: Theory and Practice by James G. Webster and Others.
22. Systems Theory Applied to Television Station Management by Jr.William G. Convington.
23. Managing Media Convergence: Pathways to Journalistic Cooperation by Kenneth C. Killebrew.
24. Managing in the Media by William Houseley and Others.
25. Making Sense of Change Management: A Complete Guide to Models, Tools, and Techniques of Organizational Change by Esther Cameron.
26. The Change Management Toolkit by C A Carnall.
27. Leading Change by John P. Kolter.
28. Selection Interviews: Process Perspectives by Robert Dipboye.

Public Relations and Corporate Communication

Introduction:
Though PR and Corporate Communication are not new for the West, in India they have acquired immense importance as an area of specialization with the liberalization and globalization of economy. Not only the multinationals but the Indian corporates too employ PR officers and CCs for effective management of media and staff.

Objectives:

- To prepare the students to be able to work as PR persons and Corporate Communicators.

Course Description:

Unit 1

- Understanding the Brand and Brand Equity
- Brand Identity and Reputation - A brief look at some of the legendary Brands (Private/Public) and comprehending brand personality (Case Studies).

Unit 2

- Evolution and History of Public Relations: Definition of PR, PR and Allied Disciplines (Publicity, Propaganda, Public Affairs and Lobbying etc.)
- Symmetrical and Asymmetrical Theories of PR.
- Law and Ethics of PR (Defamation, Copyright, Invasion of Privacy: PRSI Code of Ethics

Unit 3

- Interface of PR with Various Management Disciplines: Human Resource Development, Finance and Marketing etc.
- PR Tools: Interpersonal, Mass Media and Selective Media.

Unit 4

- PR in Industry: Public Sector, Private Sector, and Multinationals.
- PR in State and Central Governments and Functioning of Various Media Units of the State and Union Governments.

Unit 5

- Strategic PR/CC and Management: Defining Strategy and its Relevance in Public Relations and Corporate Communication, Campaign Planning, Management and Execution.
- Optimizing technology in communication design and campaign planning.
- Role of PR/CC in Crisis Communication and Disaster Management

Unit 6

- Building a Distinct Corporate Identity: Concepts, Variables and Process, Making of House Style (Logo, Lettering and Process)
- Corporate Social Responsibility and the new paradigm in Corporate Communication
- Media Relations: Organizing Press Conferences, Facility Visits, Press Briefs.
- Proactive and Reactive Media Relations.

Suggested Readings:

1. Strategic Public Relations Management: Planning and Managing Effective Communication Programme by Erica Weintraub Austin.
2. Law for Advertising, Broadcasting, Journalism and Public Relations by Michael G. Parkinson.
3. Mediamorphosis: Understanding New Media by Roger F. Fidler.
4. The fall of Advertising and the Rise of PR by Laura Ries.
5. PR Power: Inside Secrets from the World of Spin by Amanda Berry.
6. Public Relations Handbook by Theaker.
7. Public Relations: A Practical Guide to Corporate Communications Management by Sandra Oliver.
8. Running a Public Relations Department by Mike Beard.
9. Effective Internal Communication by Lyn Smith.
10. Communicating Change: Winning Employee Support for New Business Goals by T J Larkin.

Media Laws and Ethics

Introduction:

Good reporting is not the only skill necessary to make a news organization reputable. To gain the trust of viewers, listeners or readers serious consideration must also be given to ethical situations that may arise during the course of reporting. In addition to that, the prevalent media laws must be well understood by every reporter editor and must be followed at all times.

Objectives:

- To understand the duties and the rights of a reporter or editor.
- To understand the tricky dilemmas involved in news reporting.
- To understand various national and international laws that governs the Press.

Course Description:

Unit 1

- Introduction to Indian Judicial System and Terminology
- Brief History of Press Laws in India: Before and After Independence.
- Freedom of Expression and Speech under the Constitution of India.
- Laws Governing the Reporting of Court Proceedings and Contempt of Court.
- Laws Governing the Proceedings of Parliament and State Assemblies and Privileges.

Unit 2

- Official Secrets Act and Right to Information.
- Laws Concerning Airwaves.
- Laws against Defamation and Libel
- Press Council of India.

Unit 3

- Theoretical Approaches to Ethics (The Golden Mean, the Categorical Imperative, the Principle of Utility, the Veil of Ignorance, Judeo-Christian Ethics).
- Media Ethics: Ethical Decision Making (Ethics and Media Practitioners, Relationship Between Ethics Political and Social Issues, Economic Issues in Relation to Ethics)

Unit 4

- Fundamental Ethical Standards (Accuracy, Objectivity, Fairness and Balance, Fakery, Truth, Integrity of Sources), Conflict of Interest, Codes of Ethics, Moral Reasoning Processes for Ethical Decisions.
- Ethical Situations and Dilemmas (Business v/s Profession, Freebies and Junkets, Anonymous Attribution, Checkbook Journalism, Right of Privacy v/s Public Interest)

Unit 5

- Sensationalism, Decency and Good Taste (Direct Quotations, Correction of Errors, Fiction and Fact, Impact of Current Trends on Ethics (Economic Demands on Media, Globalization and War on Terror).

Suggested Readings:

1. Press Laws by D.D. Basu (Prentice Hall)
2. Press Laws by Subir Ghosh.
3. Journalistic Ethics by P.K. Bandhopadhyay and Kuldeep S. Arora.
4. Media Ethics: Cases and Moral Reasoning by Clifford G. Christians and Others. Published by Pearson Education.
5. Journalism Ethics by Phillip Seib & Kathy Fitzpatrick.
6. Ethics, Copyright & the Bottom Line by Eastman Kodak.
7. Mass Communication Law and Ethics by Roy L. More.

Mass Communication Theory

Introduction:

Any course in media and journalism requires the development of critical understanding of media and its function. Without a proper ground for understanding media, the media practitioners remain incomplete and insensible. The necessity of good journalists who understand the subtle shades of communication, the effect of processing and dissemination of information at larger scale and the responsibility of mass communication is growing day by day. A journalist who is aware of his/her society, who understands the power of communication and the change that it can make and most of all the impact of his/her work is built only with a proper ground in mass communication theory. The paper helps to make a responsible and good journalist by inspiring the power of thought and critical perception development.

Objectives:

- To develop basic ground of media literacy and critical perspective of analyzing and
- understanding media
- To understand the role, function, process, elements, importance and the characteristics of communication in society
- To understand the development of process and semiotics schools through critical analysis of various communication model
- To understand the growth and evolution of communication theories in relation to the changing society and development of thought
- To introduce to various schools of thought, prominent concepts, ideas and philosophies
- To develop multi-disciplinary approach of higher studies
- To understand the international communication process and development
- To understand the importance, application and growth of communication in development
- To realize the role of journalist in responsible and effective communication

Course Description:

Unit 1: Basics of Mass Communication

- Communication & Perspectives of Understanding: Bias, Objectivity, Stereotyping, Genre, Narrative, Feminist Critique, Media's role in power and politics, Media literacy
- Introduction to communication: Definitions, Elements and Process of communication,Barriers to Communication, Types of Communication

Unit 2: Communication Models & Theories

- Communication models: Rhetoric, SMCR, Shannon & Weaver, Newcomb, Gerbner,Westley-McLean, Berlo, Schramm, Shoemaker
- Mass communication theories: History of media theory, Mass society theory, Magic bullet theory, Propaganda – Behaviorism & Freudianism, Limited effects theory, Two step flow, Agenda setting, Uses & Gratification, Functionalism, Semiotic, Symbolic interaction, Catharsis, Social learning, Social cognition, Cultivation, Critical & cultural theories, Marxist theory, Neo-Marxist theory, Political economy, Hegemony, Spiral of Silence, Public Sphere, Innis & McLuhan, Post-modernism, Post-structuralism

Unit 3: Development Communication

- Development Communication & Development: What is development? Theories of social change, Theories of development
- Development Communication & International Communication: What is development communication? Dominant paradigm of development communication, Information flow theory, International communication – NWICO and beyond, Normative theories, Passing of dominant paradigm, Alternative approach of development communication – alternative media
- Development Communication & Journalism: Development support communication, DSC projects in India & abroad, Planning DSC projects, Journalists & Development communication

Suggested Readings:

1. Mass Communication Theory: An Introduction by Denis Mcquail.
2. Theories of Communication: A Short Introduction by a Mattelart.
3. Understanding Media by Marshall McLuhan.
4. Understanding Media Theory by Kevin Williams (Arnold 2003)
5. Mass Communication Theories and Research by Alixis Tann.
6. Communication Studies: An Introductory Reader, Edited by J Corner Hawthorn.
7. The Process and Effects of Mass Communication by Wilbur Schramm and F. Roborts (Illinois 1971)
8. Key Concepts in Television Studies by Bernadette Casey, Neil Casey, Ben Calvert, Liam French and Justice Lewis (Routledge)
9. Communication and Social Change by P.C. Joshi.
10. Designing Messages for Development by Bella Modi (Sage Publications 1991)
11. The Myth of Information Revolution: Social and Ethical Implications of
12. Communication Technology Edited by Michael Trabant.
13. The Impact of Television Advertising on Children by Namita Unnikrishnan and Shailja Bajpai (Sage Publications)
14. Key Concepts in Journalism Studies by B Franklin and others (Sage)
15. Transnational Television, Cultural Identity and Change: When STAR Came to India by M Butcher (Sage)
16. Mass Communication Theory: Foundations, Ferment, And Future by Stanely J. Baran and Dennis K. Davis

17. Globalization, Development and the Mass Media by Collin Sparks
18. Development as Freedom - Amartya Kumar Sen; Oxford University Press
19. Manufacturing Consent - Edward S. Herman & Noam Chomsky; Pantheon Books
20. Culture, Inc.: The Corporate Takeover of Public Expression - Herbert I. Schiller; Oxford University Press
21. Convergence Culture: where old and new media collide - Henry Jenkins; NYU Press

Media Research

Introduction:
Any masters' course requires the student to develop higher academic aptitude through research paper. Media research not only provides a critical outlook for analyzing media in society, but it helps in developing scientific, logical and objective thought process. The rational approach develops a problem solving attitude and management tendency. The growing research sectors in media require all the media practitioners to know and understand the various research tools and methods. The knowledge of media research helps all journalists and media practitioners to develop their performance further.

Objectives:

- To develop logical and rational thinking and scientific understanding
- To develop critical thinking process and objective approach of solving problem
- To develop research aptitude and academic approach
- To build logical problem solving attitude in relation to particular issue
- To develop wider perspective in identifying and developing research problem
- To understand research areas in media
- To expose to various research tools, methods, concepts and school of thoughts
- To expose to various up-to-date academic research works

Course Description:
Unit 1: Phase I

- **Introduction to Social Science Research:** Development of mass media research, Media research ethics, identifying a research topic, Writing a hypothesis or research questions, being aware of the limitations of a study

- **Quantitative & Qualitative Research:** What is Quantitative Research, What is Qualitative Research, Review of Literature, Citation and Bibliography

Unit 2: Phase II

- **Conceptualization and Measurement:** Variables, Concepts and measurement, Levels of measurement, Units of analysis, Validity and reliability

- **Sampling:** Why sample? Types of sampling, Sampling distribution, Sampling Error

- **Causation and Research Design:** Kinds of explanation, establishing causation, Types of Research Design, Experimental, Quasi-experimental, Longitudinal, Cross-sectional

Unit 3: Phase III

- **Data collection:** What is Data, Primary & secondary data, Data collection tools – Questionnaire, Schedule, Diary, People's meter, Phone, media source, books

- **Quantitative Methods:** Surveys, Content Analysis

- **Qualitative Methods:** Ethnography, Unstructured/Semi-structured interviewing, Participant Observation, Focus Groups, Textual Analysis

Unit 4: Phase IV

- **Data Analysis Techniques (non-statistical):** Grounded theory method, Finding patterns, Constant comparative method, concept mapping, Semiotics, Conversation analysis, Memoing, Coding, Drawing conclusion, Introducing NVivo

- **Data analysis techniques (statistical):** Coding & Tabulation, Univariate, bivariate, multivariate analysis, Frequency distribution, Measures of Central Tendency, Measures of Dispersion – Range, variance, Standard deviation, Introducing SPSS

Total Marks: 100 (Written Exam:50, Final Product: 30, Internal Assment:20)

Suggested Readings:

1. Mass Media Research: An Introduction by Roger D. Wimmer and Joseph R. Dominick
2. The Practice of Social Research by Earl Babbie
3. Qualitative Media Analysis (Qualitative Research Methods) - David L. Altheide; Sage University Press
4. Qualitative Communication Research Methods - Thomas L. Lindlof, Brian C. Taylor; Sage Publications
5. Strategies for Interpreting Qualitative Data - Martha S. Feldman; Sage University Paper
6. Journalism & Mass Communication Quarterly - Association for Education in Journalism & Mass Communication

Advertising Communication: Process and Planning

Unit 1: Advertising Concepts

- Evolution, growth and types of advertising.
- Advertising agencies its hierarchy, structure and functioning.
- Advertising theory: Persuasion, ELM, advertising effects and changes in attitude.
- Understanding the various media for communication-introduction to media operations and media planning.
- DAGMAR and the conviction model, AIDA sequence, promotion and demand curve relation.
- Consumer Behavior---External and Internal factors
- Laws and ethics in advertising, Social responsibility, Apex Bodies in Advertising and their code---ASCI, AAAI.
- Seven Ps of marketing, marketing mix, STP and marketing strategy.
- Product life cycle, marketing mix and integrated marketing communications

Unit 2: Crafting Advertising Campaigns

- The Process of Advertising Creation—Situational analysis, marketing plan and advertising plan, advertising feedback.
- The Brand: Concept and management, strategy and structure, positioning, image and personality
- Advertising approaches and appeals : Language, sound, graphics and visuals and scripting for ads.
- Campaign planning and brief writing.
- Crafting online campaigns: Social media and WOM campaigns
- Retention, audience development using mass and social media: SEO

Unit 3: Evaluation and Assessment of Campaigns

- Market and advertising research: Types of marketing research, pre-test, post-test, positioning research, demographics, psychographics, Using big data

- Public Service Advertising, Social marketing and CSR activities-an evaluation and assessment.

Suggested Readings:

1] Advertising & Promotion – Belch and Belch
2] Consumer Behaviour – Schiffman & Kanuk
3]Advertising Management – Batra, Aaker

Advanced Gaming and Animation Scripting

- User Interface – Mobile gaming
- Game Design
- Game Animation

The Science of Screenplay Writing & Production

1. The elements of design
2. Understand the difference between Theater/ television & Cinema
3. Visualize an idea
4. Developing the main character & other sub characters
5. Developing a synopsis from the idea
6. Generate a treatment for the subject.
7. Build the required scenes to create the crisis, climax & the resolution to narrate the story.
8. The basic screen grammar
9. Basic principles of editing
10. Understanding different image sizes & their functions
11. Guidelines for writing dialogues
12. Production of a short film (Practical)

Puppetry

Course Objectives:

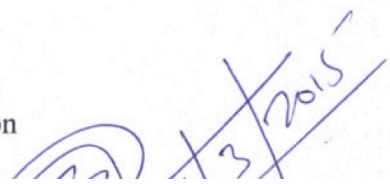
- The objective of this course is to introduce the students to various Traditional forms of communication and media through lectures, visits to performances and student seminars.
- The course will help to strengthen the students to work in teams and managing resources.
- The other objective is to train the students in the art of the Puppetry.
- Students will be encouraged to develop their original scripts and performances in groups and exhibit their ideas through the performances. This helps them to relate the process of communication through traditional media with that through the modern media.
- To Train students in acting, this will help in the other audio visual courses in the later semesters of this course.

Module-1 Understanding the theory and Practice of Puppetry

- Puppet in folk tradition of India
- Different kinds of traditional Puppets – demonstration
- Puppetry in films (ref: Bengali '*Bhrantibilas'*, English '*Sound of Music'*)
- Contemporary Puppet Theatre in India as well as in other parts of the World
- Purposeful application of puppetry in different context /
- difference between traditional and modern puppetry
- Puppetry and its connection to new media like stop animation, T.V etc
- Social application of Puppetry- Puppetry for Communication
- Appropriate Themes for communication
- Understanding the Strengths and limitations of the Puppetry medium

Module-II Developing Puppets, script and stage

- Story Telling Techniques
- Writing a script and making a story board.
- Introduction to materials and tools
- Design and Construction of Puppets
- Dramaturgy, Stagecraft and set design
- Learning to manipulate puppets
- Manipulation exercises
- Blocking, Casting, Rehearsals
- Body and voice exercises
- Location hunting, advertising to assure an audience
- Performance with real audience, Feedback collection
- Analysis and evaluation



Module-III Performance

- Puppet play performance
- Students will chose a school or a public place or any appropriate place to perform in front of real audience. Student will seek feedback from the audience. Students will share the feedback of the audience and their introspection with the rest of the class.

References:

Living Dolls – The Story of Indian Puppets - Jiwan Pani , Publications Division,Ministry of I&B

Karnataka Puppetry – S.A.Krishnaaiah

Shiksha Mein Srijanatmak Natak Evam Kathputli Nartan – Meher Contractor

Handicraft of India – Kamladevi Chattopadhyay

Leather Puppetry in Karnataka – M.S. Nanjunda Rao

Rawan Chaya – Jivan Pani,Sangeet Natak Akademi Publication

Tolu Bommalata –Shadow Puppets of Andhra Pradesh – M.Nagbhushan Sharma ,Sangeet Natak Akademi Publlication

Tolpava Koothu-Shadow Puppets Kerala – G.Venu , Sangeet Natak Akademi Publication

Ayodhya Kand of Tolpava Koothu – KrishnaKutty Pulavar-Sangeet Natak Akademi Publication

Sangeet Natak Vol.XXXVI,issue No. 1,2,3,&4,2001

Sangeet Natak Journal Nos. 98 -127 -128

Sangeet Natak Akademi Annual Report 2002-2003

Brochure of 'Swarn Jayanti Putul Yatra Festival' of the Sangeet Natak Akademi

Indian Puppets by Sampa Ghosh&Utpal.K.Bannerjee.Abhinav Publication,New Delhi.

Kathputli – The World of Rajasthani Puppeteers – Nazir Ali Jairazbhoy

Kathputli Shikshan - Dinesh Chander Bansal

Bachon Ke Liye Putliyan – Devi Lal Samar

Kathputli Natikayan – Bharatiya Lok Kala

Bachon Ki Sanskritik Shiksha – Devi Lal Samar

Puppetry and Folk Dreams – Anupama Shah

Street Theatre

Course Objectives:

- The objective of this course is to introduce the students to various Traditional forms of communication and media through lectures, visits to performances and student seminars.
- The course will help to strengthen the students to work in teams and managing resources.
- The other objective is to train the students in the art of Street Theatre.
- Students will be encouraged to develop their original scripts and performances in groups and exhibit their ideas through the performances. This helps them to relate the process of communication through traditional media with that through the modern media.
- To Train students in acting, this will help in the other audio visual courses in the later semesters of this course.

Module-I Introduction to Traditional Media

- Nature of the performing genre
- Performers and patronage / Background
- Performance: space, text, texture and context
- Performance details: costumes, musical instruments, songs, makeup and characters
- Historical understanding of performance based communication
- Understanding society thorough performance

Module-II Understanding the theory and Practice of Street Theatre

- Understanding various approaches to theatre
- Theatre as a medium of communication
- Form, Content, Themes
- The roots of street theatre in the theatre movement in the India and West
- Body Exercises and warm-ups (every class), group work
- Discussions will be initiated after every exercise.
- Working with senses, actor-non actor addressing the myths.
- Improvisation: arrivals and departures: individual and group.
- Working with imagination, observation.
- Readings on Stanislavsky, Augusto Boal, Checkov, Brecht,Grotowsky,Ngugi.
- Developing Scripts for Street play performance
- Working on movement
- Improvisation: mood swings, music work, song variation.
- Readings on Safdar Hashmi, Utpal Dutt, Habib Tanvir, Guru Charandas, IPTA.
- Voice exercises for Street Theatre: breathing, singing, rhythmic work

- Further exploration of traditional children games in improvisation followed by discussion.
- Indian dances exploring rhythms and basic steps of some folk traditions.
- Developing a street play. Team coordination, props, songs, formations, form
- Performance and audience

Module-III- Performance

- Street Play performance
- Students will chose a school or a public place or any appropriate place to perform in front of real audience. Student will seek feedback from the audience. Students will share the feedback of the audience and their introspection with the rest of the class.

References:

Banes, Sally and Andre Lepecki, eds. (2007) *The Senses in Performance*. New York and London: Routledge

Bradford, D. Martin. *The Theatre in the Street: Politics and Performance in the Sixties America*. University of Massachusetts Press, 2004.

Cohen-Cruz, Jan. Radical Street Performance. Routledge,1998.

de Certeau, Michel. "Part III: Spatial Practices." *The Practice of Everyday Life*. University of California Press,1984.

Deutsche, Rosalyn. (1996) *Evictions: Art and Spatial Politics*. Cambridge, MA and London: The MIT Press

Felshin, Nina, ed. (1995) *But is it Art? The Spirit of Art as Activism*. Seattle: Bay Press.

Harper, Glenn, ed. (1998) *Interventions and Provocations: Conversations on Art, Culture, and Resistance*. Albany: State University of New York Press.

Harris, Sue. (2004) '"Dancing in the Streets": The Aurillac Festival of Street Theatre' *Contemporary Theatre Review* 14.2, 57-71.

Hill, Leslie and Helen Paris, *Performance and Place*. Palgrave Macmillan, 2006.

heatre Journal 55.4 (December 2003): 591-612.

_____. *The Politics of Performance: Radical Theatre as Cultural Intervention*. Routledge, 1992.

_____. *The Radical in Performance Between Brecht and Baudrillard*. Routledge, 1999.

Mason, Bim. *Street Theatre and Other Outdoor Performance*. London and New York: Routledge, 1992.

Meyerhold, Vsevolod. "The Fairground Booth." *Meyerhold on Theatre*. Translated and edited by Edward Braun. Hill and Wang, 1969.

Sanderson, Christopher Carter. *Gorilla Theatre: A Practical Guide to Performing New Outdoor Theatre Anytime, Anywhere*. Routledge, 2003.

Street Theatre: Impressions and Images. Education and Culture: Culture 2000 Programme of the European Union, n.d.

16/3/2015

Gaming and Animation Scripting

Elective 2: Gaming and Animation Scripting +* (Also offered to students of Master of Mathematics Education, a Meta University Course)

- **Game Design**
  1. What is Game
     a. Definition of Game
     b. Why people play games
     c. How games are different from other forms of entertainment
     d. Game Genre
     e. Elements of a game
  2. History of Games
  3. Game Concepts
  4. Game Production Parts
     a. Game Art
     b. Coding
     c. Quality Assurance
     d. Management
  5. Game Development Process
     a. Stages of Game Development Process
  6. Game Design Document
     a. What is Game Design Document
     b. Why it is needed
     c. What are its advantages and disadvantages
     d. Sample Game Design Document
     e. A Game Design Document template
  7. Artificial Intelligence
     a. What is Artificial Intelligences
     b. Artificial Intelligence Techniques
        i. Path Finding
        ii. Flood Fill
        iii. Expert System
        iv. Fuzzy Logic
        v. Neural Network
        vi. Genetic Algorithm

vii. Deterministic Algorithm

- **User Interface – Mobile gaming**

8. User Interface For Games
    a. Types of user interface
    b. Qualities of a good user interface
    c. Localization
    d. Sprites, Heads Up Display (HUD)

- **Game Animation**

9. Game Narrative
    a. Linear and non-linear narrative structures
    b. Designing game narrative
    c. Non Linear Story Telling
10. Intellectual Property Protection for Video Games
    a. Trademarks
    b. Copyrights
    c. Patents
    d. Trade Secrets
11. Game Analysis
    a. Game Analysis of any classic game like Tetris
    b. Game Analysis of any current popular game
    c. Game Analysis of any current popular mobile game or app

- Game (or Apps) Development for various platforms like Mobile, Tablet, PC, Console etc. using any Game Engine Software (example Unreal Editor or Unity)

+Students have to opt for 1 animation elective courses for II semester.
*The elective courses will be offered based on the availability of the faculty and number of students opting for the course.

Evaluation
Total Marks: 100
Internal Assessment: 25
End-Semester Examination: 75

SYLLABUS
Introduction to South Indian Cinema
Semester-I (2015)

Course Objectives:

- The aim of the course is to introduce students to the four major film industries in South India.
- To introduce students to the new areas of research on South Indian Cinema.
- This course will focus not only the historical part, but also the craft of filmmaking, technology; fan clubs, stardom, cine politics, themes, etc. are some of the important areas that the course will offer.

Unit-I: Introduction to South Indian Cinema

Brief history of Telugu, Tamil, Malayalam and Kannada film industries
Features of the four Industries
Introduction to Industry-Film making, Distribution and Exhibition

Unit-II: Genres of South Indian Cinema

Socials, Bhakti, Mythological, Melodrama,
Caste based cinema, Naxalite cinema etc.
Changing trends in Genres-dubbing, remake, overseas audience

Unit-III: Cine-Politics

Film stars and political existence
NTR to Chiranjeevi
Rajkumar
M.G.R, Jayalalitha to Vijayakanth

Unit-IV: Fans, Fan clubs and Stardom

The Star system in South Indian Cinema
Importance of Fans and Fan clubs
The ecosystem of Fan clubs
The changing trends in Fan clubs

Assessment			CREDITS
	Marks	**Total Marks**	
Internal Assessment:			**4**
Seminar	10	25	
Research essay	15		
Semester end examination	75	75	
		100	

List of Suggested Reference Material*:

Ashish Rajadhyaksha, P. W. (1999). *Encyclopedia of Indian Cinema.* Routledge.
Baskaran, S. T. (2008). *Sivaji Ganesan:The legends of Indian cinema.* Wisdom Tree.
Baskaran, S. T. (2013). *The Eye of the Serpent: An Introuduction to Tamil Cinema.* India: Tranquebar.
Bhaskaran, G. (2010). *Adoor Gopalakrishnan: A Life In Cinema.* India: Penguin .
Dickey, S. (1993). *Cinema and the Urban Poor in South India (Cambridge Studies in Social and Cultural Anthropology).* Cambridge University Press .
Nalini Shivkumar, R. M. (2015). *Unforgettable: The Iconic Women of South Indian Cinema.* India: Rupa & Co.
Pandian, M. (1992). *The Image Trap: M.G. Ramachandran in Film and Politics.* India: SAGE Publications Pvt. Ltd.
Pillai, & T., M. (2010). *Women in Malayalam Cinema: Naturalising Gender Hierarchies.* Orient Blackswan.
Pillai, S. E. (2015). *Madras Studios: Narrative, Genre, and Ideology in Tamil Cinema.* New Delhi: SAGE Publications Pvt. Ltd.
Prasad, M. M. (2014). *Cine-politics: Film Stars and Political Existence in South India.* New Delhi: Orient Blackswan.
Rajkumar, P., & Banwasi, P. N. (2012). *Dr. RAJKUMAR The Person behind the personality.* PARVATHAMMA PUBLICATIONS .
S.V.Srinivas. (2013). *Politics as Performance: A Social History of the Telugu Cinema* . Bangalore: Permanent Black.
Sengupta, S., & Reitano, N. (2015). *Discovering Indian Independent Cinema: The Films of Girish Kasaravalli.* CreateSpace Independent Publishing Platform.
Vaasanthi. (2008). *Cut-outs, Caste and Cine Stars: The World of Tamil Politics.* India: Penguin Books .
Velayutham, S. (2008). *Tamil Cinema: The Cultural Politics of India's other Film Industry (Media, Culture and Social Change in Asia Series).* India: Routledge.

*** The lists of reading references above are for those who wanted to purse the subject further. Reading specific for each topic will be provided to students separately.**

M.Sc. IN MATHEMATICS EDUCATION

SYLLABUS

Basic Gaming

CODE NO - MVE- 208 – PAPER NO.- MVE- 13 : Basic Gaming

- Introduction to Gaming
- Game Concept and simple game creation
- E Card
- Flash Game
- Mobile Game

Evaluation

Total Marks: 100

Theory Examination : 75

Internal Assessment : 25

M.A. DEVELOPEMNT COMMUNICATION
&
M.Sc. IN MATHEMATICS EDUCATION

SYLLABUS

MDC10-Social Development

Unit1: Nature of Communities

- Types of Communities: tribal, religious, minorities, rural, urban and Dalits
- Challenges and issues in communities

Unit 2: Demographic profile

- Country profile
- Population
- Literacy
- Focused state and their challenges

Unit3: Social Development Programmes

- NRHM,SSA,ICDS,MREGA,NSA and others
- State health society
- Role of Communication in addressing Development programmes

Total marks: 100

- **Theory : 75**
- **Internal Assessment : 25**

M.A. DEVELOPEMNT COMMUNICATION
&
M.Sc. IN MATHEMATICS EDUCATION

SYLLABUS

MDC10-Social Development

Unit1: Nature of Communities

- Types of Communities: tribal, religious, minorities, rural, urban and Dalits
- Challenges and issues in communities

Unit 2: Demographic profile

- Country profile
- Population
- Literacy
- Focused state and their challenges

Unit3: Social Development Programmes

- NRHM,SSA,ICDS,MREGA,NSA and others
- State health society
- Role of Communication in addressing Development programmes

Total marks: 100

- **Theory : 75**
- **Internal Assessment : 25**

Assessment/Marks:

Internal Assessment: 25

Final Theory Examination: 75

Total Maximum marks: 100

Readings:

- Film Art: An Introduction 10th Edition by Bordwell and Thompson, 2012
- Ways of seeing by John Berger, 1972
- Understanding Movies by Louis Gianetti, 13th edition , 2013

Intensive English Communication: an interactive approach
Course offered under CBCS

Objectives-
This course aims to fill the gaps in the betterment of a learner's effective communication in English, whatever be the situation he/she may find him/her self in. Language learning in the classroom varies from actual language used in the street or in other everyday activities, outside the classroom (in the real world).
This course aims to provide opportunities to learners, to activate their passive skills and to help them reach their goals in communicating effectively in English.

Course instructor: Dr. Shubhada KAUL.

Speaking and Oral Comprehension-

i - use of authentic audio texts for the purpose of understanding them and being able to answer questions based on those texts, that could be asked.
ii - active and passive skills
iii - what to look out for.....

Clues, Cues and Coping Strategies-

i - accents, regional variations with specific references to Indian English
ii - listening- a much neglected skill; reading – another much neglected skill.....
iii - learner's expressions/output

Writing Skills-

i - how to write effectively
ii - task based skill

Evaluation- internal assessment = 25 &
end semester examination = 75 marks.

References & Reading Material-
a-www.esl-lounge.com/level1.....level2.....etc....
b-http://www.teachingenglish.org.uk/
c-http://www.esl-galaxy.com
d-http://www.icte.uq.edu.au.

other materials will be provided as needed.

-21-

Scheme of Examination
for
Meta University Concept based course

M. Sc. (Mathematics Education)

1. Combined semester-wise result of the Meta University concept course M. Sc. (Mathematics Education) would be declared on the basis of marks system as per details given in this document.

2. For every paper studied under Meta University concept course M. Sc. (Mathematics Education) at University of Delhi and at Jamia Millia Islamia, the total marks and breakup of marks for Theory Paper and for Internal Assessment along with pass percentage during four semesters is as given in the table below.

3. For every innovation project / project work done in a paper, the marks system of this component will be as given in the table below.

Note
The examination for papers studied by students at JMI will be conducted at JMI. *
The examination for papers studied by students at DU will be conducted at DU.

Declaration of semester-wise result and issuing of Mark-sheets carrying logo of both DU and JMI shall be the responsibility of Examination Branch University of Delhi.

* JMI examination branch will provide result of these papers to DU.

Semester I

S. No.	Paper Title	Offering Centre	Credits	Total Marks	Marks Breakup	Pass Percentage
I.1	Calculus: Role in real life	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
I.2	Perspectives in Mathematics Education	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
I.3	Paper option 1 from JMI*	AJKMCRC, JMI	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
I.4	Paper option 2 from JMI*	AJKMCRC, JMI	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
I.5	Innovation Project-I: Interlinking mathematics & real world problems	CIC,DU/JMI	**8**	**200**		**40% in Total**
		Total	**24**	**700**		

Semester II

S. No.	Paper Title	Offering Centre	Credits	Total Marks	Marks Breakup	Pass Percentage
II.1	Demystifying the power of data: Probability & Statistics	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
II.2	Curriculum and Evaluation in Mathematics	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
II.3	ICT in Mathematics Education	CIC,DU	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
II.4	Learning ways of Mathematical writing	CIC,DU	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
II.5	Innovation Project-II: Internship in Educational setting-I	CIC,DU/JMI	**8**	**200**		**40% in Total**
		Total	**24**	**700**		

Semester III

S. No.	Paper Title	Offering Centre	Credits	Total Marks	Marks Breakup	Pass Percentage
III.1	Discretizing and understanding Real Life Situations Through a Mathematical Lens	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
III.2	Art of Teaching Mathematics	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
III.3	Digital Technology in Mathematics Education	CIC,DU	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
III.4	Research Methodology in Education	CIC,DU	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
III.5	Innovation Project-III: Internship in Educational Setting-II	CIC,DU/JMI	**8**	**200**		**40% in Total**
			24	**700**		

Semester IV

S. No.	Paper Title	Offering Centre	Credits	Total Marks	Marks Breakup	Pass Percentage
IV.1	Understanding mathematical language of ordinary differential equations and complex analysis	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
IV.2	Research Investigation in Mathematics Education	CIC,DU	**5**	**150** A . Theory 100 B . Project 50	A. Written 75 IA 25	**40% in Total** A. 40% in written 40% in Total B. 40% in Project
IV.3	Paper option 3 from JMI*	AJKMCRC, JMI	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
IV.4	Paper option 4 from JMI*	AJKMCRC, JMI	**3**	**100**	Written 75 IA 25	**40% in Total** 40% in Written
IV.5	Innovation Project-IV: Research Dissertation	CIC,DU/JMI	**8**	**200**		**40% in Total**
			24	**700**		

* List of papers to be opted from JMI

1. English for Media Communication
2. Advertising
3. Contemporary India and the World We Live in
4. Development Journalism
5. Media Management
6. Public Relations and Corporate Communication
7. Media Laws and Ethics
8. Mass Communication Theory
9. Media Research

Note:

The decision to offer two or three specific papers from amongst the above-mentioned papers or any other course approved by Academic Council of JMI varies from semester to semester. Syllabus of the papers to be opted from JMI presently is as per approved syllabi of AJKMCRC.

Approved Examination Seven Digit Paper codes for Meta University Course M. Sc. (Mathematics Education) by Examination Branch, University of Delhi

- University Code : 1for DU, 2 for JMI
- Department code for Cluster Innovation Centre (CIC) : 91
- Course code for M.Sc. (Mathematics Education) : 3
- Semester codes for M.Sc. (Mathematics Education) : 1/2/3/4
- Paper codes for papers offered by University of Delhi : 01 to 10
- Paper codes for papers offered by Jamia Millia Islamia : 01 to 12

Detailed approved examination codes for papers offered by University of Delhi since July 2014:

Paper Title	Semester	Offering University	Approved Examination Code
Calculus: Role in real life	I	DU	1913101
Perspectives in Mathematics Education	I	DU	1913102
Innovation Project-I: Interlinking mathematics & real world problems	I	DU	1913103
Demystifying the power of data: Probability & Statistics	II	DU	1913201
Curriculum and Evaluation in Mathematics	II	DU	1913202
ICT in Mathematics Education	II	DU	1913203
Learning ways of Mathematical writing	II	DU	1913204
Innovation Project-II: Internship in Educational setting-I	II	DU	1913205
Discretizing and understanding Real Life Situations Through a Mathematical Lens	III	DU	1913301
Art of Teaching Mathematics	III	DU	1913302
Digital Technology in Mathematics Education	III	DU	1913303
Research Methodology in Education	III	DU	1913304
Innovation Project-III: Internship in Educational Setting-II	III	DU	1913305
Understanding mathematical language of ordinary differential equations and complex analysis	IV	DU	1913401
Research Investigation in Mathematics Education	IV	DU	1913402
Innovation Project-IV: Research Dissertation	IV	DU	1913403

Detailed approved examination codes for papers offered by University of Delhi up to June 2014:

Seeing the world through calculus: First Steps	I	DU	1913104
School Curriculum, Concept, Processes and Assessment	I	DU	1913105
Innovation project-I.5	I	DU	1913106
Does Nature play dice?: The amazing world of probability and statistics	II	DU	1913206
Mathematics, Curriculum, Pedagogy and Evaluation	II	DU	1913207
English Language Proficiency Course: Basic/Intermediate	II	DU	1913208
Innovation Project-II.4	II	DU	1913209
Discretizing and understanding Real Life Situations Through a Mathematical Lens	III	DU	1913309
English Language Proficiency Course: Intermediate/Advanced Level	III	DU	1913306
Creativity in the Digital World: Graphics & Multimedia	III	DU	1913307
Innovation project III.4	III	DU	1913308
Modeling continuous change through ordinary differential equations and complex analysis	IV	DU	1913404
Understanding Economic Behaviour: The Macro Level	IV	DU	1913405
Innovation project IV.5	IV	DU	1913406

Detailed approved examination codes scheme for optional papers offered by Jamia Millia Islamia:

(Represents options 01 to 12)**

Sem	Paper Title	Offering University	Proposed Examination Code
I	To be opted from list given below	JMI	29131**
I	To be opted from list given below	JMI	29131**
IV	To be opted from list given below	JMI	29134**
IV	To be opted from list given below	JMI	29134**

List of the papers offered by Jamia Millia Islamia and detailed approved examination codes:

S. No.	Paper Title	Offering University	Code for semester I	Code for semester IV
1.	English for media communication	JMI	2913101	2913401
2.	Advertising	JMI	2913102	2913402
3.	Contemporary India and the world we live in	JMI	2913103	2913403
4.	Development Journalism	JMI	2913104	2913404
5.	Media Management	JMI	2913105	2913405
6.	Public Relations and Corporate Communication	JMI	2913106	2913406
7.	Media Laws and Ethics	JMI	2913107	2913407
8.	Mass Communication Theory	JMI	2913108	2913408
9.	Media Research	JMI	2913109	2913409
10.	Advanced Gaming and Animation Scripting	JMI	2913110	2913410
11.	The Science of Screenplay Writing & Production	JMI	2913111	2913411
12.	Advertising Communication: Process & Planning	JMI	2913112	2913412
13.	Street Theater	JMI	2913113	2913413
14.	Puppetry	JMI	2913114	2913414
15.	Gaming and Animation Scripting	JMI	2913115	2913415
16.	Introduction to South Indian Cinema	JMI	2913116	2913416
17.	Basic Gaming	JMI	2913117	2913417
18.	Social Media for Development Communication	JMI	2913118	2913418
19.	Film Appreciation	JMI	2913119	2913419
20	Intensive English Communication	JMI	2913120	2913420

Promotion Scheme for M.Sc. (Mathematics Education)

(i) General Rules:

1. A student shall earn full credits for a paper if she/he passes the paper and shall earn no credit if she/he fails in the paper.
2. All students shall be promoted from first to second semester irrespective of their performance in first semester. Similarly, all students shall be promoted from third to fourth semester irrespective of their performance in third semester.
3. A student shall be eligible for promotion from 1st year to 2nd year (third semester) provided she/he has passed five out of ten papers. (i.e. minimum 50% of the papers)
4. A student not eligible for promotion from 1st year to 2nd year (third semester), however, shall retain her/his marks secured in papers she/he passed and that of Internal assessment only in papers she/he has not passed.
5. If a student fails in an Innovation Project paper, she/he has to either redo the project or carry out a new project.
6. A student will be given a maximum of three chances in total to pass a paper as and when that paper's examination takes place within three years of his first appearance in the examination of that paper.
7. No supplementary examination shall be conducted.
8. A student shall be awarded the degree only if he/she passes in all the papers.
9. Grand Total of marks of all four semesters is 2800. A student shall be awarded first division if she/he secures 60% or more marks in aggregate. A student shall be awarded second division if she/he secures marks between 50% or more marks but less than 60% in aggregate. A student shall be awarded third division if she/he secures marks between 40% or more marks but less than 50% aggregate.

(ii) Reappearance in passed papers:

1. A student may reappear in any theory paper prescribed for a semester, on foregoing in writing her/his previous performance in the paper/s concerned. This can be done in the immediate subsequent semester examination only. The result for this paper will be revised incorporating current performance.
2. In the case of a candidate, who opts to re-appear in any paper/s under the aforesaid provisions on surrendering her/his earlier performance, but fails to reappear in the paper/s concerned, the marks previously secured by the candidate in the paper/s in which she/he has failed to re-appear shall be taken into account while determining her/his result of the examination held currently.
3. A student who reappears in a theory paper shall carry forward the internal assessment and project/practical marks, originally awarded in that paper.
4. Reappearance in a passed Innovation project paper shall not be allowed.

(iii) Attendance Requirements

1. For papers studied at University of Delhi, student shall have to fulfill the attendance rules of University of Delhi.
2. For papers studied at Jamia Milia Islamia, student shall have to fulfill the attendance rules of Jamia Millia Islamia

----END----

Course of Study

B. Tech. (Information Technology & Mathematical Innovations)

Scheme of study and examination

CLUSTER INNOVATION CENTRE
UNIVERSITY OF DELHI

INDEX

Content: B.Tech. (IT & Mathematical Innovations)

B. Tech. (IT & Mathematical Innovations)

Preamble

This unique course, the first one to be offered at Cluster Innovation Centre, is designed to inculcate an innovation mindset as part of the curriculum and pedagogy. Building strong analytical skills through Mathematics and application skills of Information Technology (IT), this course encourages students to recognize the connectedness of various disciplines. Using IT as a vehicle for connecting mathematics with other disciplines, students are encouraged to develop innovative products and processes as part of curriculum. The course aims to produce adequately skilled graduates with a creative mindset who can provide new solutions to industry in particular and to society in general. It is hoped that some of these innovators will be entrepreneurs, who will be job providers rather than job seekers. The course is specifically designed to boost undergraduate research.

The course offers three specialization streams – Management, Electronics & Embedded System and Systems Biology – important fields of education with significant interface with Mathematics and IT currently. The mode of learning shall be a healthy and productive blend of the formal and the inquiry based, with special focus on "hands on" and "project based" mode of learning. Learning shall happen to a large extent through teacher mentoring and peer learning that encourages creativity and relies on innovations.

Upon graduation, these students would have acquired innovation based creativity and would have matured in their thinking. They will have enhanced their communication and leadership abilities, and will have understood the deep and abiding connections between knowledge and its uses - between understanding the needs of society and the relevance of knowledge and the importance of societal obligations. Experiments, hands-on projects, innovative projects, model implementations linked to the curriculum will be carried out in the "Engineering Kitchen: Innovation Lab". Assessment, at each stage, is designed in a manner to incentivize innovation by encouraging students to carry out new creative application of the theoretical knowledge acquired, either through a project, or through a laboratory activity/prototype in the engineering kitchen.

NO OF SEATS: 40

DURATION: 8 Semesters (4 years)

ELIGIBILITY: A minimum aggregate marks at 10+2 level as follows

General Category	: 60 % in four subjects (including mathematics)
OBC category	: 54% in four subjects (including mathematics)
PH category	: 55% in four subjects (including Mathematics)
SC/ST category	: Passing marks with Mathematics as one subject

ADMISSION: Through a written MCQ based entrance test conducted at Delhi.

COURSE FEE: As notified by the university time to time

B. Tech. (IT & Mathematical Innovations)

COURSE STRUCTURE

Key: T: Theory, L: Lab, P: Project/Internship

Semester I

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
I.1	Seeing the world through ***Calculus***. First steps through symbolic mathematics	3	3	0	6	75	75	0	150
I.2	Linearity in Nature: Engineering through ***Linear Algebra***. First steps through numerical algorithms	3	3	0	6	75	75	0	150
I.3	Optimizing memory use through ***Data Structure and Design***	4	0	0	4	100	0	0	100
I.4	The Science and Art of Logic and Programming: **Algorithms**	4	0	0	4	100	0	0	100
I.5	Physics at work I: ***Deconstructing Machines***	3	3	0	6	75	75	0	150
I.6	***Business, Entrepreneurship and Innovation Management***	4	0	0	4	100	0	0	100
I.7	***Environment Science & Ecosystem Management***	2	0	0	2	50	0	0	50
	Grand Total	23	9	0	**32**	575	225	0	800

Key: T: Theory, L: Lab, P: Project/Internship

Semester II

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
II.1	Modeling continuous changes through ***ordinary differential equations and complex analysis***	3	3	0	6	75	75	0	150
II.2	Understanding real life situations through ***Discrete Mathematics***	4	0	0	4	100	0	0	100
II.3	Decoding ***Computation Structure & Logic***	4	0	0	4	100	0	0	100
II.4	Reflecting thought processes via ***Object Oriented Programming***	3	3	0	6	75	75	0	150
II.5	Physics at work II: ***Deconstructing devices***	3	3	0	6	75	75	0	150
II.6	Art of ***Communication & Creative Writing***	3	0	0	3	75	0	0	75
II.7	**Knowing specialization streams (Electives)**								
II.7.1	***Business processes and strategic IT alignment***	3	0	0	3	75	0	0	75
II.7.2	***Electronics at work & circuit simulations***	3	0	0	3	75	0	0	75
II.7.3	***Exploring Biology - Systems Approach***	3	0	0	3	75	0	0	75
	Grand Total	23	9	0	**32**	575	225	0	800

Note:

1. The student may opt for one or more papers in II.7. Only one paper will be included in the transcript as credit paper and the others as non-credit paper.

2. At the end of second semester, the student will opt for only one of the streams and will pursue papers meant for that stream in the subsequent semesters.

Key: T: Theory, L: Lab, P: Project/Internship

Semester III

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
III.1	Modeling change in the world around us: ***Partial Differential Equations***	4	0	0	4	100	0	0	100
III.2	Handling information through ***Data Modeling & Design***	3	3	0	6	75	75	0	150
III.3	Instructing computing devices: ***Operating System***	4	0	0	4	100	0	0	100
III.4	Language and Communication: ***Computational Linguistics***	4	0	0	4	100	0	0	100
III.5	**Specialization Stream – 1**								
III.5.1	Understanding ***Economic Behavior***: The ***micro*** level	4	0	0	4	100	0	0	100
III.5.2	***Electronics circuit elements and instruments***	4	0	0	4	100	0	0	100
III.5.3	***Integrative Biology***	4	0	0	4	100	0	0	100
III.6	**Specialization Stream – 2**								
III.6.1	***Principles of Management***	4	0	0	4	100	0	0	100
III.6.2	***Electronics circuit elements and instruments – Innovation Lab***	0	4	0	4	0	100	0	100
III.6.3	***Cell: Biochemical and Molecular perspective***	4	0	0	4	100	0	0	100
III.7	Summer Internship : projects drawn from the world around us	0	0	6	6	0	0	150	150
	Grand Total	23	3	6	**32**	575*	75*	150	800

Note:

1. The students will attend papers in III.5 & III.6 only from the opted stream

2. * For students opting for Electronics stream, the total marks for theory in this semester will be 475 and total marks for practical will be 175

3. The student will execute the internship III.7 during the preceding summer break.

Key: T: Theory, L: Lab, P: Project/Internship

Semester IV

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
IV.1	Does Nature play dice?: The amazing world of ***probability and statistics***	3	3	0	6	75	75	0	150
IV.2	Understanding Computing ***Systems Architecture***	3	3	0	6	75	75	0	150
IV.3	***Software Engineering***	3	0	0	3	75	0	0	75
IV.4	***Science, Philosophy, Truth: Impact of technology***	3	0	0	3	75	0	0	75
IV.5	**Specialization Stream – 3**								
IV.5.1	Understanding ***Economic Behaviour***: The ***macro*** level	4	0	0	4	100	0	0	100
IV.5.2	***Digital electronics and logic design***	4	0	0	4	100	0	0	100
IV.5.3	***Genes to Genomes***	4	0	0	4	100	0	0	100
IV.6	**Specialization Stream – 4**								
IV.6.1	Bringing Companies and clients together: **Sales & Marketing management**	4	0	0	4	100	0	0	100
IV.6.2	***Digital electronics and logic design*** – Innovation Lab	0	4	0	4	0	100	0	100
IV.6.3	***Flow of information in living systems***	4	0	0	4	100	0	0	100
IV.7	Semester long innovation project	0	0	6	6	0	0	150	150
	Grand Total	20	6	6	**32**	500*	150*	150	800

Note:

1. The student will attend papers in IV.5 & IV.6 only from the opted stream

2. * For students opting for Electronics stream, the total marks for theory in this semester will be 400 and total marks for practical will be 250

3. The student will finalize the semester long project title, area, and mentor(s) for IV.7 during Semester III. The project work will commence from the beginning of the preceding winter break.

Key: T: Theory, L: Lab, P: Project/Internship

Semester V

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
V.1	Algorithms for Computational Mathematics: ***Numerical Methods***	3	3	0	6	75	75	0	150
V.2	Information exchange in computing devices: ***Data Communication & Networking***	4	0	0	4	100	0	0	100
V.3	Computer and Brain: Knowledge Discovery and ***Artificial Intelligence***	3	0	0	3	75	0	0	75
V.4	***History, culture & civilization***	3	0	0	3	75	0	0	75
V.5	**Specialization Stream – 5**								
V.5.1	Maximizing performance: ***Human Resource management and Organizational Behavior***	4	0	0	4	100	0	0	100
V.5.2	***Embedded systems studio - I***	4	0	0	4	100	0	0	100
V.5.3	***Biological Networks***: from Micro to Macro niche	4	0	0	4	100	0	0	100
V.6	**Specialization Stream – 6**								
V.6.1	Efficient manufacturing process: ***Production and Operations Management***	3	3	0	6	75	75	0	150
V.6.2	***Signals & Systems Engineering***	3	3	0	6	75	75	0	150
V.6.3	***Applied Genomics and Proteomics***: Methods and techniques	3	3	0	6	75	75	0	150
V.7	Industrial mini project	0	0	6	6	0	0	150	150
	Grand Total	20	6	6	**32**	500	150	150	800

Note:

1. The Student will attend papers in V.5 & V.6 only from the opted stream

2. The student will execute the Industrial mini project V.7 during the preceding summer break

Key: T: Theory, L: Lab, P: Project/Internship

Semester VI

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VI.1	Linear Construction of Actions: Engineering through ***Linear Programming and Game Theory***	4	0	0	4	100	0	0	100
VI.2	***Computer Graphics and Visualization***	3	3	0	6	75	75	0	150
VI.3	***Advanced Algorithm Design***	3	0	0	3	75	0	0	75
VI.4	***Art & Design***	3	0	0	3	75	0	0	75
VI.5	**Specialization Stream – 7**								
VI.5.1	Handling money: ***Finance management***	4	0	0	4	100	0	0	100
VI.5.2	***Embedded systems studio – II***	4	0	0	4	100	0	0	100
VI.5.3	***Biodefense and Bioengineering***	4	0	0	4	100	0	0	100
VI.6	**Specialization Stream – 8**								
VI.6.1	***e - Business***: Organization and Strategy	3	3	0	6	75	75	0	150
VI.6.2	***Control systems***	3	3	0	6	75	75	0	150
VI.6.3	***In silico Biology***	3	3	0	6	75	75	0	150
VI.7	Project in Industry, Society and Villages	0	0	6	6	0	0	150	150
	Grand Total	20	6	6	**32**	500	150	150	800

Note:

1. The student will attend papers in VI.5 & VI.6 only from the opted stream

2. Students will finalize the semester long project title, area, and mentor(s) for VI.7 during Semester V. The project work will commence from the beginning of the preceding winter break.

Key: T: Theory, L: Lab, P: Project/Internship

Semester VII

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VII.1	Fluidity in nature: computational interpretations	4	0	0	4	100	0	0	100
VII.2	***Computer Language Design & Engineering***	3	0	0	3	75	0	0	75
VII.3	***Software Project Management***	3	3	0	6	75	75	0	150
VII.4	***Visual arts & aesthetics***	3	0	0	3	75	0	0	75
VII.5	**Specialization Stream – 9**								
VII.5.1	***Environment Management***	4	0	0	4	100	0	0	100
VII.5.2	Engineering at Molecular Scale: ***Devices and Nanotechnology***	4	0	0	4	100	0	0	100
VII.5.3	Modeling and Simulating Brain Functions: ***Computational Neuroscience***	4	0	0	4	100	0	0	100
VII.6	**Specialization Stream – 10**								
VII.6.1	***Business automation strategies***. ERP. Case studies and project in industry	3	3	0	6	75	75	0	150
VII.6.2	***Circuit Analysis and Synthesis***	3	3	0	6	75	75	0	150
VII.6.3	***Systems Biology***	3	3	0	6	75	75	0	150
VII.7	Industrial mini project, Simulation of real time cases	0	0	6	6	0	0	150	150
	Grand Total	20	6	6	**32**	500	150	150	800

Note:

1. The student will attend papers in VII.5 & VII.6 only from the opted stream

2. Students will execute the Industrial mini project VII.7 during the preceding summer break

Key: T: Theory, L: Lab, P: Project/Internship

Semester VIII

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VIII.1	Industrial Internship/Major Project	0	0	32	32	0	0	800	800
	Grand Total	0	0	32	**32**	0	0	800	800

Note:

1. Students will decide the field of work and the organization for execution of the Industrial Internship/Major Project VIII.1 during Semester VII.

B. Tech. (IT & Mathematical Innovations)

PROMOTION CRITERIA

1. The minimum marks required to pass in any paper in a semester, whether theory or practical, shall be 40%. For theory paper, the student must secure 40% in the end semester evaluation and 40% in "Internal + end semester evaluation" of the paper.

Nature of paper	Credits	Minimum passing marks requirements
Theory	2	14 marks in end semester written examination and 20 marks in total
	3	22 marks in end semester written examination and 30 marks in total
	4	10 marks in semester long innovation project, 20 marks in end semester written examination and 40 marks in total
Practical	3	12 marks in the innovation project, 18 marks in the lab activities and 30 marks in total
	4	16 marks in the innovation project, 24 marks in the lab activities and 40 marks in total
Internship, Semester long projects,	6	36 marks in mentor assessment and 24 marks in the board evaluation.
Semester long Industrial internship, Major Projects	32	320 marks

2. A student who does not satisfy the criteria (1) above in any paper shall have to repeat the paper. The student shall be awarded ER (Essential Repeat) in that paper.

3. A student who has to reappear in any paper of Semester I/ III/ V/ VII may do so only in the subsequent semester examination for Semester I/ III/ V/ VII respectively. Similarly if a student has to reappear in any paper of Semester II/ IV/ VI may do so only in the subsequent semester examination for Semester II/ IV/ VI respectively.

4. A student who reappears in any paper (theory or practical) shall carry forward the marks of the internal assessment originally awarded to him/her.

5. Total credit in eight semesters is 256. A student passing a paper will earn the total credit assigned to that paper.

6. A student shall be eligible for promotion from 1st year to the 2nd year if he/she accrues at least 50% of the total credits in Semester I and Semester II combined. Similarly a student shall be eligible for promotion from 2nd year to the 3rd year if he/she accrues at least 50% of the total credits in Semester III and Semester IV combined (irrespective of the result at the end of the first year). A student shall be eligible for promotion from 3rd year to the 4th year if he/she accrues at least 50% of the total credits in Semester V and Semester VI combined (irrespective of the result at the end of the second year). A student shall be eligible to have passed the 4th year provided he/she earns 256 credits during Semester I to Semester VIII.

7. No student will be held back in Semester I/ III/ V/ VII.

8. A student who does not satisfy criterion (6) is required to repeat a year. However, he/she can retain the marks of all or some of the papers that do not carry an ER.

SPAN PERIOD

The span period to complete the course shall be six years from the year of admission.

ATTENDANCE

Averaged percentage of attendance to appear in the end semester examination shall be as per University Rules for Undergraduate Degree Examinations at the time.

B. Tech. (IT & Mathematical Innovations)

EVALUATION SCHEME

There will be continuous assessment based on class tests, presentations, seminars, assignments, projects etc. There will be an **Evaluation and Review Committee (ERC)** for each Semester. The Programme Coordinator will be the Chairman of the ERC and all CONVENERS (teachers teaching major portions of a paper) concerned for the semester will be its members.

FUNCTIONS OF THE ERC

a. To finalize examination schedule, its notification, preparation of invigilation chart and conduct of end semester examinations.

b. To ensure timely Preparation of question papers and Evaluation of answer books for the end semester examination. ERC may assign full or a part of the work to any other faculty member of CIC.

c. To periodically assess the continuous evaluation of the papers and project/internship.

d. To determine and notify the eligibility of appearing in the end semester examination based on the attendance percentage prior to the commencement of the end semester examination.

e. To ensure timely notification of internal assessment marks. To consider such individual representations of students about internal evaluation which have not been possible to reconcile between the student and the concerned teacher and take the remedial action if needed. The case will be scrutinized by the ERC and the decision of the ERC shall be final.

f. Students will be shown the evaluated end semester answer books within ten days of the completion of the end semester evaluation. Any discrepancy may be brought to the notice of ERC. The case will be examined by ERC with one outside expert to be appointed by the Program Coordinator, and the decision of the ERC shall be final.

g. To review and moderate end semester results of each class with a view to maintain uniformity of standard.

h. To prepare the consolidated results semester wise and sending them to the University Examination Branch for declaration of results, and also to ensure reconciliation with university database for future reference and issue of marksheets/transcripts.

EVALUATION

a. The evaluation or assessment for each theory paper with 4 credits shall be based on regular internal assessment throughout the semester (25 marks), a semester long innovation project in the field (25 marks, evaluated as part of the end semester examination) and a final end-semester written examination (50 marks).

b. The evaluation or assessment for each theory paper with 3 credits shall be based on regular internal assessment throughout the semester (20 marks), and a final end-semester written examination (55 marks).

c. The evaluation or assessment for each theory paper with 2 credits shall be based on regular internal assessment throughout the semester (15 marks), and a final end-semester written examination (35 marks).

d. The evaluation or assessment for a laboratory paper with 3 credits shall be based on regular internal assessment throughout the semester (45 marks for laboratory activities and 30 marks for the innovation project).

e. The evaluation or assessment for a laboratory paper with 4 credits shall be based on regular internal assessment throughout the semester (60 marks for laboratory activities and 40 marks for the innovation project).

f. For the project work or internship carried out either during the semester or during the summer break (Semester III – Semester VIII), broad guidelines for the evaluation shall be as follows:

I. Evaluation of projects/ Internship with 6 credits.

(i) A candidate/group of candidates will be mentored by a teacher OR a responsible person in industry/organisation as assigned by the Programme Coordinator. On completion of the project, the students will submit a brief written report to the ERC. The report will be examined by a board of examiners (one board for 10 students), consisting of three members appointed by the Director, CIC on the recommendation of ERC.

(ii) The evaluation will be on the work carried out by the student, written report and viva/ presentation. 60% weightage (90 marks) will be given to the continuous performance (by the mentor) and 40% weightage (60 marks) for the final assessment (by the board of examiners) after the completion of the project.

II. Evaluation of 32 Credits Industrial Internship/Major Project (Semester VIII)

A dissertation should be submitted at the end of VIII semester. However, ERC may grant extension, not exceeding the maximum duration of the semester but not more than six months at a time. The dissertation will be examined by a board of three members appointed by the Director, CIC on the recommendation of the ERC. A viva-voce examination will be conducted by the board and marks awarded taking into consideration both dissertation and viva.

B. Tech. (IT & Mathematical Innovations)

COURSE CONTENT

SEMSTER – I

I.1 Seeing the world through calculus. First steps through symbolic mathematics [Theory + Practical] [Semester I] [3 + 3]

Limits and continuity - Limits at infinity - Indeterminate forms - Special limits involving exponential and logarithmic functions – Asymptotes - Graphs of function and its derivatives - Optimization problems - Fluency in differentiation - Concavity and inflexion points - Integration - Parametric equations of curves, arc length and surface area - Vector valued functions, differentiation and integration of vector valued functions - Sequences, infinite series including Taylor approximations, Power series - Functions of several variables - Level curves and surfaces - Limits and continuity of functions of two and three real variables - Partial differentiation (two variables), partial derivative as a slope, partial derivative as a rate, Maxima and Minima - Multiple Integrals, line, surface and volume integrals - Applications of Green's, Stokes and Gauss's Theorem.

Engineering Kitchen Activity (Symbolic Mathematics Software) [Laboratory]

- Introduction of basic functions
- Plotting of graphs of functions and their derivatives
- Manipulating the parameters in a graph
- Fitting of a curve
- Parametric plot of curves (Eg. Trochoid, Cycloid, Epicycloid)
- Obtaining surfaces of revolution of curves
- Plotting functions of two variables and their level curves
- Graphical illustration of limits for functions of two variables
- Innovation Project

References

1. *Calculus*, T. M. Apostol, Volumes 1 and 2, Wiley Eastern, 1980.
2. *Calculus - Single and Multivariable*, Hughes-Hallett et al., John-Wiley and Sons, 2003.
3. *Calculus*, James Stewart, Thomson, 2003.
4. *Calculus and Analytic Geometry*, G. B. Thomas and R. L. Finney, Addison-Wesley, 1998.

I.2 Linearity in Nature: Engineering through Linear Algebra. First steps through numerical algorithms [Theory + Practical] [Semester I] [3 + 3]

Algebra of matrices – Determinants - Hermitian, Skew-Hermitian and Unitary matrices - Vectors and vector operations in 2 and 3 dimensions - Solution and application of linear matrix system AX = B - Eigenvalues and eigenvectors, minimal polynomial, Cayley-Hamilton therorem and diagonalisation - Sets, relations, functions - Groups, subgroups - Abstract vector spaces, subspaces - Finite dimensional vector spaces - Linear independence and dependence of vectors, bases, dimension of vector spaces - Finite dimensional inner product spaces - Orthogonal sets and projections, Gram Schmidt process, orthogonal diagonalisation

Engineering Kitchen Activity (matrix based numerical mathematics software) [Laboratory]

- Basic arithmetic operations, hierarchy of arithmetic operations
- Declaration and assignment of variables
- Introduction to elementary mathematical functions
- Dealing with matrices and arrays
- Basic programming with loops (for, while, switch), if else statements
- Programs for solving system of linear equations, Orthogonalization
- Creating 2D, 3D plots
- Innovation project

References

1. *Linear Algebra and its Applications*, D. C. Lay, Addison Wesley, 2005.
2. *A Modern Introduction*, David Poole, *Linear Algebra,* Brooks Cole, 2011.

I.3 Optimizing Memory use through Data Structure and Design [Theory + Project] [Semester I] [4]

Basic concepts - Dynamic optimization - Memory Hierarchy - Hashing - Networks and Graphs - Search - Heaps

References:

1. *Algorithms and Data Structures*, N. Wirth, Prentice-Hall of India, 2009
2. *Data Structures and Algorithms in C++,* A. Drozdek, Course Technology, 2013

I.4 The Science and Art of Logic and Programming: Algorithms [Theory + Project] [Semester II] [4]

Algorithmic analysis and modeling - Algorithmic proofs - Computational complexity - Asymptotic notation and analysis - NP Completeness

References:

1. *Introduction to Algorithms*. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. MIT Press, 2009.
2. *Problem Solving with Algorithms and Data Structures Using Python*. Bradley W. Miller, and David L. Ranum. Franklin, Beedle & Associates, 2011.

I.5 Physics at work I: Deconstructing Machines [Theory + Practical] [Semester I] [3+3]

Newtonian Mechanics (Kinematics & Dynamics) - Classical Mechanics at work - deconstructing mechanical systems - Universal Gravitation - Oscillations - Inertial & Non-inertial frames - Central force motion - Understanding rotational dynamics - Efficiency and mechanical advantage in simple and complex machines: Levers, Pulley, Wheel & Axles, Gear systems, Hydraulic systems - Forms of energy and conversion between different forms of energy.

Engineering Kitchen Activities [Laboratory]

1. Concepts of measurement, error, precision, accuracy. Concept of scale. Understanding Measuring Instruments
2. Understanding oscillation using simple and compound pendulums
3. Mechanics system with 850 Universal Interface – understanding Newtonian Dynamics
4. Measurement of Moment of inertia from rotational dynamics
5. Roller coaster dynamics – computer simulation and physical verification
6. Coupled pendulum motion – using webcam and image analysis
7. Ballistic Pendulum
8. Understanding physics of complex machines – one implementation of "Tod-Phod-Jod" concept.
9. Visualization in 3D and understand how things work – Building a CAD model in 3D to trace the flow of power, energy, information and material.
10. Innovation project – designing instruments, machines, prototypes, applets

References:

1. *Classical Mechanics*. Herbert Goldstein, Pearson Education, 2011.
2. *A Textbook of Machine Design*. R. S. Khurmi, and J. K. Gupta, S. Chand Publishing, 2005.

I.6 Business, Entrepreneurship and Innovation Management [Theory + Project] [Semester I] [4]

Understanding Business - Types of Business Activities - Evaluating the Business - Business organization - Starting a Business - Entrepreneurship concept - Entrepreneurial attributes & characteristics – Leadership - Business Plan preparation - B2B and B2C models - Creativity & its components - Invention vs. Innovation - Types of innovation - Innovation and Technology - Innovation policy & IPR - Commercialization of Innovation.

References:

1. *Entrepreneurship*. R. D. Hisrich, M. P. Peters, and D. A. Shepherd, D. A., New York: McGraw-Hill / Irwin (New York), 2005
2. *Innovation and entrepreneurship: Practice and principles*. P. F. Drucker, Elsevier, USA, 2006.

I.7 Environmental Studies and Ecosystem Management [Theory] [Semester I] [2]

Relationship between environment and public health - Sustainable development: policy and practices - Biodiversity: Hotspots, Threats, Conservation - Ecosystem: Structure, Function, Energy flow, cycles - Environmental pollution & public health - Mitigation strategies - Policy - Collection and processing of environmental data - IT in ecosystem & environment management - Social and Cultural parameters - Environmental Risk & Impact Assessment.

References:

1. *Fundamental Concepts in Environmental Studies, D.D. Mishra, (S Chand & Co Ltd.), 2014.*
2. *Environmental Management for Sustainable Development,* Chris Barrow, *(Routledge Environmental Management Series), 2nd Ed.*, 2006.
3. *Essentials of Environmental Management,* Paul Hyde and Paul Reeve, (IOSH Services Ltd. UK.), 2004.
4. *Environmental Impact Assessment Methodologies,* Y. Anjaneyulu, Valli Manicka, (CRC Press), 2011.
5. *Fundamentals of Ecological Modelling*, S.E. Jorgensen and G. Bendorrichio (Elsevier), 3rd Ed., 2001.
6. *Introduction to Environmental Economics*, Nick Hanley, Jason F. Shogren and Ben White, (Oxford University Press), 2001.

SEMESTER II

II.1 Modeling continuous change through ordinary differential equations and complex analysis [Theory + Practical] [Semester II] [3 + 3]

First order differential equations - Variable separable, homogeneous, linear, exact differential equation - Integrating factors - Existence and uniqueness of solution - General solutions of second order differential equation - Homogeneous and non-homogeneous differential equations with constant coefficients - Method of variation of parameters - Method of undetermined coefficients, higher order differential equations with constant coefficients - Planar autonomous linear systems with graphical representation - Determination of stability and classification of equilibrium of a planar nonlinear system by linearization - Power series solution about a regular point of an analytic ordinary differential equation - Power series solution of Legendre and Bessel's equation - Orthogonality of Legendre and Bessels function - Laplace transform methods applied to differential equations - Analytic functions of a complex variable: Power-series expansions, Laurent expansions and Liouville's theorem - Complex integration - Cauchy Integral Theorem - Residue Theorem and applications to evaluate real integrals.

Engineering Kitchen Activity (through mathematical software) [Laboratory]

- Plotting of slope fields and solution curves of first order and higher order differential equations
- Graphical analysis of solution of Population model, Pollution Model, Acceleration – Velocity Models
- Projectile motion, Mechanical Vibrations – Motion of Simple Pendulum, Free undamped and damped motion, Forced undamped and damped motion
- Plotting of phase plane diagrams for predator – prey model, competing species, epidemic model and their analysis
- Innovation project

References

1. *Elementary differential equations*, W. E. Boyce and R. DiPrima, John Wiley, 2005.
2. *Differential equations and boundary value problems: Computing and modeling*, C.H. Edwards and D.E. Penny, Pearson education (Singapore), Pte. Ltd., 2005.
3. *Advanced engineering mathematics*, E. Kreyszig, John Wiley, 1999.

II.2 Understanding real life situation through Discrete Mathematics [Theory + Project] [Semester II] [4]

Combinatorics: Sets, counting of sets - Permutation - Combination - Inclusion - exclusion - Generating functions - Recurrence relations - ***Graph Theory***: Introduction - Basic terminologies

- Graph representation - Euler relation - Isomorphism - Connectivity - Cut vertices and edges - Covering - Euler and Hamilton paths and circuits - Shortest Path Algorithms: Dijkstra's algorithm - Travelling salesman problem - Scheduling problems - Matching - Independent sets - Coloring - **Planar graph**: idea of region - Euler formula - Kuratowski theorem and application - **Tree**: basic terminology, traversal, Prefix code - Idea of data compression: Huffman code - Spanning tree - Minimum spanning tree: Prim's and Kruskal method.

References:

1. *Discrete and Combinatorial Mathematics,* Ralph Grimaldi, International Edition, 2003.
2. *Discrete Mathematical Structures,* Bernard Kolman, Robert Busby, Sharon Ross, International Edition, 2008.
3. *Discrete Mathematics and Its Applications,* K. H. Rosen, McGraw-Hill, 2008.

II.3 Decoding Computation Structure and Logic [Theory + Project] [Semester III] [4]

Sets - Graphs - Digital abstraction - Automata - Combinatorial Logic - Randomness - Context free languages

References:

1. *Computation Structures*. Stephen Ward & Robert Halstead, MIT Electrical Engineering and Computer Science, 1989.
2. *Discrete computational structures*, Robert R. Korfhage, Academic Press, 1974

II.4 Reflecting thought processes through Object Oriented Programming [Theory + Practical] [Semester I] [3 + 3]

Background Programming Systems - Migration of Objects & Classes - Theory of OOPS paradigms & Concepts - OOPS Features in Real Systems - Applications and Framework

Engineering Kitchen Activities [Laboratory]

- Programs implying the use of Arrays, Linked Lists, Strings, Loops
- Programs on Object & Classes from Realistic Environment and Systems
- Programs demonstrating Constructors, Destructors, Methods & other concepts
- Programs Showcasing Inheritance, Polymorphism, Encapsulation & other OOPS features
- Programs on Exception Handling, Packages and Threading
- Reverse Engineering a Java Source/ project/Mobile Application and understanding the concepts
- Mapping the programs with Real life Systems and showcasing the implementation
- Innovation project

References:

1. *C++ For Artists: The Art, Philosophy, and Science Of Object-Oriented Programming*. Rick Miller, Pulp Free Press, 2008
2. *Java For Artists: The Art, Philosophy, And Science Of Object-Oriented Programming*. Rick Miller , Pulp Free Press, 2008

II.5 Physics at work II: Deconstructing Devices [Theory + Practical] [Semester I] [3+3]

Basics of Electrostatics and Electrodynamics - Electric Circuit elements and function - Current, voltage, capacitance, resistance - Power and efficiency in electrical appliances - Joule heating - Electrical safety devices - Basics of Electromagnetism - Electromagnets and induction - Transformers. DC motors and generators - AC motors - Using electromagnetic spectrum - Information transfer and broadcasting - Use of Radiation energy and appliances - Photovoltaic cells and conversion of solar energy to electricity - Advantages, limitations and challenges of different solar cell technologies - Different forms of renewable energy and technology.

Engineering Kitchen Activities [Laboratory]

1. Electric circuit, power requirement, cost of electricity, energy efficiency of sample appliances
2. Potential divider, measurement of resistances of different scales
3. Build a buzzer
4. Conversion of solar power to electricity using photovoltaic cells: design, working principle, performance, application
5. Build an autonomous robot
6. Build a remote controlled robot
7. Understanding physics of devices – one implementation of "Tod-Phod-Jod" concept.
8. Innovation project – designing instruments, devices, model & prototyping

References:

1. *Introduction to Electrodynamics*. David. J. Griffiths, PHI Learning, 2012
2. *Textbook of Electrical Technology* – Volume I & II. B. L. Thareja, and A. K. Thareja, S. Chand Publishing, 2006

II.6 Art of communication and Creative Writing [Theory] [Semester II] [3]

Language and Communication - Context - Barriers to communication - speech and writing - writing skills - linguistic unity, coherence, and cohesion - scientific and technical writing - oral interactional skills - formal and informal speech - public speaking - negotiation - group discussion - comprehension - intelligent listening.

Creativity - Poetry - Narrative - Dramatic writing - Creative process - Cultural experience - Creative communication skills in daily life - Retention of traditional narratives - Story telling

References:

1. *Study Writing: A Course in Written English for Academic Purpose*. Liz Hamp-Lyons, and Ben Heasley, Cambridge University Press, 2006

II.7.1 Business Process and strategic IT alignment [Theory] [Semester II] [3]

Introduction to different business Processes: Human Resources, Production, Operations, Marketing and Finance - Business process linkage with IT - IT enabled Businesses - IT governance & architecture - IT enabled change management - Business Analysis strategies & planning - Cost Benefit analysis - Enterprise Resource Planning - Digital Marketing and Media - Internet, Multimedia, and Mobile apps in business.

References:

1. *IT Enabled Business Change - Successful Management*. S. Manwani, The British Computer Society, 2009
2. *Exploiting IT for Business Benefits*, B. Hughes, The British Computer Society, 2009
3. *Projects: Planning, Analysis, Selection, Financing, Implementation, and Review*, P. Chandra, Mc Graw Hill Education, 2009.
4. *E-Business and E-Commerce Management : Strategy, Implementation and Practice*, D. Chaffey, Pearson Press, 2013.

II.7.2 Electronics at Work & Circuit simulation [Theory] [Semester II] [3]

Analog World: resistor, capacitor, inductor, power source, transducer, sensor, detector, switch – Potentiometer - Integrated Circuit – Transformer; ***Digital World:*** logic families, logic gates, boolean algebra - Combinational circuits: adders, encoders, decoders, multiplexer and de-multiplexer - Sequential circuits: like flip flops, counters, shift registers, memories – ***Semiconductor Devices:*** PN Junctions characteristics, Zener and Avalanche breakdown, diode applications, transistor & applications. FET, MOSFET, FET, Operational Amplifier (Op Amp):

inverting and non-inverting amplifier, integrator, differentiator, summing amplifier, active filters - ***Signal and System:*** Types, Generation, Audio and Video Signals and their applications, Operation on Signals, Classification of Signals and Systems, Discrete Convolution & Correlation

Reference:

1. *Electronic Principles*. Albert Paul Malvino, McGraw-Hill, 1998
2. *Electronic Devices & Circuit Theory*. Robert L. Boylestad, and Louis Nashelsky, Pearson Education, 2009
3. *Digital Logic and Computer Design*. M. Morris Mano, Pearson Education, 2008
4. *Signals and Systems*. Alan V. Oppenheim, Alan S.willsky, and Nawab S.Hamid, Prentice Hall, 1997
5. *Art of Electronics*. Paul Horowitz, and Winfield Hill, Cambridge University Press, 2008

II.7.3 Exploring Biology: Systems approach [Theory] [Semester II] [3]

Organism: origin of life and what organisms do, Biological sciences: from descriptive to reductionist to systems biology, Metabolism in living state, Living systems as energy machines, Cycles and life, Life cycles, Cell cycle & turnover, Origin and diversification of living systems, Hierarchy of organization of living systems (molecular, cellular, and population levels), Evolution of living systems: probabilistic versus deterministic.

References:

1. *Biology*, Raven et al., Tata McGraw-Hill, 2013.
2. *Biology: Global Approach*. Reece et al., Pearson Educations, Global edition, 2014.

SEMSTER – III

III.1 Modeling Change in the World Around Us: Partial Differential Equations [Theory + Project] [Semester III] [4]

Familiarities with different type of first order linear and non-linear PDEs - Examples of PDEs arising in transport equation, conservation laws, spread of epidemic cholera - Cauchy problem for first order PDE - method of characteristics, - Monge's cone - Classical methods for simple PDE models. - Second order PDE arising in wave equations, conduction of heat, gravitational potential, telegraph equation, dispersion of contaminants - classification of second order PDE and their solution - Fourier Series and Fourier transforms - Boundary value problem: Dirichlet and Neumann - Lagrange – Green's identity - existence and uniqueness by energy considerations.

References

1. *Partial Differential Equations*, E. DiBenedetto, Birkhauser, Boston, 1995.

2. *Partial Differential Equations*, Fritz John, Narosa Publ. Co., New Delhi, 1979.

3. *Linear Partial Differential Equation for Scientists and Engineers*, Tyn Myint-U and Lokenath Debnath, Springer, Indian reprint, 2006.

4. *Partial Differential Equations: An Introduction with Mathematica and MAPLE*, Ioannis P Stavroulakis and Stepan A Tersian, World Scientific, 2004.

III.2 Handling Information through Data Modeling & Design [Theory + Practical] [Semester III] [3 + 3]

Traditional Files & Databases – Database Management Systems – Relational Model - ER Modeling – Constraints, Query language & features – Normalization – Indexing – Transaction Processing & Concurrency Control – PL/SQL Basics – Graph Databases - Data Modeling Techniques & UML – Analysis of Data using Mining Techniques – Study of Real World Applications

Engineering Kitchen Activity [Laboratory]:

- ER Diagram of Existing systems and new systems
- SQL Commands, Structures & execution of Commands on Test Database
- Creation of Databases and identifying the Constraints
- Execution of DDL, DML, TCL Queries on created database
- XML Databases
- Executing Aggregate Functions and Extraction of Data elements
- Programs on Database Objects including Procedures, Functions, Exception
- Modeling of Systems and Requirements using UML
- Design of Application(s) using Mining Techniques
- Reverse Engineering & Study of a Database System Architecture
- Innovation Project

References:

1. *Database System Concepts*, Abraham, H. and Sudershan, S., 5 Ed., McGraw-Hill, 2013

2. *Introduction to Data Mining*, Pang, N. T., Pearson Education, 2013

3. *Database System : The Complete Book*, Jeffrey Ullman, Jennifer Widom, and Héctor García-Molina, Pearson Education, 2008

4. *Data Modeling: A Beginners Guide*, Andy Oppel, McGrew Hill, 2010

III.3 Instructing Computing Devices: Operating System [Theory + Project] [Semester III] [4]

Operating System Structures – Process, Memory & CPU management – Processes, Threads & Dispatching – Scheduling – Deadlocks – Linkers – Virtual Memory – Dynamic Storage Management – Demand Paging – Storage Devices – File System – Flash Memory – Virtual Machines – Distributed Operating System - Study & Analysis of Unix/Linux/Windows/Android

References:

1. *John. Lions' Commentary on UNIX® 6th Edition with Source Code*. John Lion, San Jose, CA: Peer-to-Peer Communications, 1996

2. *Exokernel: An Operating System Architecture for Application-Level Resource Management.,* Engler, Dawson R., M. Frans Kaashoek, and James O'Toole Jr., ACM Press, 1995.

3. *Operating System Concepts*, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons, 2009

III.4 Language and Communication: Computational Linguistics [Theory + Project] [Semester III] [4]

Introduction to Natural Language Processing (NLP) - Language structure and Analyzer - Morphological Analysis - Local Word Grouping - Parsing - Computational grammar and requirements - Machine Translation - Lexical semantics and algorithms – Spoken Language System – Tagging – Speech synthesis – Speech recognition

References:

1. *Natural Language Processing*, A. Bharati, V. Chaitanya, R. Sangal, Prentice Hall India, 1995

2. *Natural Language Processing with Python: analyzing text with the Natural Language Toolkit*, Steven Bird, Ewan Klein, and Edward Loper, O'Reilly, 2009.

3. *Speech and language processing: an introduction to natural language processing, computational linguistics, and speech recognition* (2nd edition), Daniel Jurafsky and James H. Martin, Pearson International, 2009

III.5.1 Understanding Economic Behavior: The Micro Level [Theory + Project] [Semester III] [4]

Exploring the subject matter of Economics - The Economic Problem: Scarcity and Choice; the question of What to Produce, How to Produce and How to Distribute Output, Markets and Competition - Determinants of individual demand & supply - Demand-Supply schedule and curves - Market versus individual demand & supply - Shifts in the demand & supply curve, Market Interactions - How Price allocate resources - Elasticity and its application - Controls on Prices, Taxes and the Costs of Taxation, Households and Consumer Behavior - Budget Constraints - Firms and Producer Behavior - Perfect Market Structure - Imperfect Market Structures - Monopoly and antitrust policy - government policies towards competition, Imperfect information in the product market - The information problem - The market for lemons and adverse selection and Input Markets.

References

1. *Principles of Economics*, K. E. Case, R. C. Fair and S. C. Oster, Pearson Education, 10th Edition, 2011.
2. *Principles of Economics,* N. G. Mankiw, South-Western, 6th Edition, 2011.
3. *Intermediate Microeconomics,* Hal R. Varian, W.W. Norton & Company and Company/Affiliated East-West Press (India), 8th edition, 2010.
4. *Microeconomics,* R. S. Pindyck and D. L. Rubinfeld, Pearson Education, 8th Edition, 2012.

.

III.5.2 Electronics Circuit Elements and Instruments [Theory + Project] [Semester III] [4]

AC Fundamentals - Concept of voltage and current sources - KVL and KCL - Node voltage analysis and method of mesh currents - Network theorems - PN Junction: variants and applications - Bipolar Junction Transistor (BJT) biasing and amplifier design - Field Effect Transistor (FET) variants – FET biasing and amplifier design - Structure and working of SCR. Structure and operation of LDR, Photo voltaic cell, Photo diode, Photo transistors and LED, Operational Amplifiers basics and practical circuits - Feedback and oscillator circuits - Voltmeters- Multimeters - Function generator- Cathode ray oscilloscope - Cathode Ray Tube.

References

1. *Circuits and Networks* - A.Sudhakar & Shyammohan S. Palli ,TMH, 2010
2. *Principles of Electronics*- V.K. Mehta and Rohit Mehta, S Chand &Co,2009
3. *Electronic Devices and Circuit Theory*-R.L.Boylestad and L.Nashelsky, Pearson Education, 2009.

III.5.3 Integrative Biology [Theory + Project] [Semester III] [4]

Demystifying living state – Nature of biological processes – Approaches to study Biology: Observational and Experimental, Physiology and Behavior - the regulated activities – Communication (external & internal) as the basis of regulation – Circuits and regulations in living systems – Interaction of biological components – Information flow in living systems: Proximate and Ultimate causes – Model organisms in study of Biology, Chaos and Order.

References:

1. *An Introduction to Systems Biology: Design Principles of Biological Circuits,* Uri Alon, Chapman & Hall, 2nd edition, 2013.
2. *Physical Biology of the Cell*, **Phillips et al.,** Garland Science, 2nd edition, 2012.
3. *Molecular Cell Biology*, Lodish et al., W. H. Freeman & Company, 7th edition, 2012.
4. *Biochemistry*, Berg, Tymoczko and Stryer, W H Freeman & Company, 7th edition, 2011.

III.6.1 Principles of Management [Theory + Project] [Semester III] [4]

Evolution of Management Thoughts - contribution of selected management thinkers - Environmental Analysis, Growth Strategies, Decision making and Decision Support System, Organizational Citizenship Behavior - Group Dynamics - Approaches to management - Contemporary Management practices in Global Environment - Management Functions: Planning, Organizing, Staffing and controlling - Introduction to various streams of management Motivation Theories – Leadership Theories - Management of Change - Knowledge Management Case studies - IT Applications

References

1. *Management Concepts and Strategies,* J.S.Chandan, Vikas Publishing House, 2010.
2. *Management Concepts and Practices*, Tim Hannagan, Macmillan India Ltd., 5th Edition, 2009.
3. *Essentials of Management,* Koontz, Tata McGraw-Hill, 7th Edition, 2006.

III.6.2 Electronics circuit elements and instruments – Innovation Lab [Practical + Project] [Semester III] [4]

Engineering Kitchen Activity [Laboratory]:

- Characteristics of PN junction and Zener diode
- Half wave rectifier.
- Full wave rectifier with 2 diodes.
- Full wave rectifier with 4 diodes (Bridge rectifier).
- Input, Output and Transfer characteristics of CE and CC Amplifier.
- Characteristics of LDR, Photo-diode and Photo transistor.

- Transfer characteristics of JFET.
- Transfer characteristics of MOSFET (with depletion and enhancement mode)
- Characteristics of LED with three different wavelengths.
- Series voltage Regulator.
- Shunt voltage Regulator.
- Characteristics of Thermistor
- Innovation Project

III.6.3 Cell: Biochemical and Molecular perspective [Theory + Project] [Semester III] [4]

Molecular interactions – Enzyme kinetics – Bioenergetics and Metabolism – energy transduction in the living organisms (photosynthesis and respiration) – Cell organelles – Cell membrane and extracellular matrix – Cytoskeleton and membrane trafficking – Cell division and checkpoints – Cell signaling – Origin of eukaryotes: hypothesis.

References

1. *The cell: A Molecular Approach*, Geoffrey M Cooper, Sinauer Associates 6th edition, 2013.
2. *Molecular Biology of the Cell* , Alberts et al., Garland Science, 5th edition, 2007.
3. *Molecular Cell Biology*, Lodish et al., W. H. Freeman & Company, 7th edition, 2012.
4. *Biochemistry*, Berg, Tymoczko and Stryer, W H Freeman & Company, 7th edition, 2011.

SEMSTER – IV

IV.1 Does Nature play dice? : The amazing world of probability and statistics [Theory + Practical] [Semester IV] [3 + 3]

Probability space - Conditional probability - Bayes theorem – Independence - Descriptive measures (Mean, median, mode, standard deviation, dispersion, moments) - Random variables - Joint distributions - Discrete distributions (Bernoulli, Binomial, Poisson) and their properties (Expectation, variance, conditional expectation, moments) - Continuous distributions (Uniform, Normal, Exponential) with their properties (Expectation, variance, conditional expectation, moments) - Joint, marginal and conditional distributions - Weak and strong law of large numbers, -Central limit theorem - Sampling distributions - Hypothesis testing, interval estimation - Likelihood, analysis of categorical data - Curve fitting - linear regression, Correlation - Test statistic and their significance.

Engineering Kitchen Activity [Laboratory]:

Computer program R and its application to simple models

- Introduction to basic syntax of R for arithmetic operations, creating arrays and matrices
- Getting data into R and basic data analysis in R
- Statistical computations in R (evaluation of density functions and distribution functions, computation of descriptive measures for given data)
- Data visualization in R
- Innovation Project

References

1. *Introduction to Probability and Statistics for Engineers and Scientists*, S.M. Ross, Academic Press, 2009.

2. *Applied Statistics and Probability for Engineers,* D.C. Montgomery and G.C. Runger,John Wiley and Sons, 2014.

3. *Design of Experiments: A No-Name Approach*, Thomas Lorenzen and Virgil Anderson, CRC Press 1993.

4. *Statistics and Experimental Design in Engineering and the Physical Sciences*, Vol. I and II, N.L. Johnson and F.C. Xeen Leone, Wiley Interscience, 1977.

IV.2 Understanding Computing Systems Architecture [Theory + Practical] [Semester IV] [3 + 3]

Complex Instruction Set Computers – RISC - Pipelining – Cache – Virtual Memory – Superscalar Architecture – VLIW – EPIC – Buses and Arbitrations – Power Management –

Performance Analysis and Optimization Models - Multithreaded Processors – Parallel Processors – Datacenter architecture

Engineering Kitchen Activity [Laboratory]:

- Logic Gate Designs
- Deconstructing Digital Architecture of a computing devices and study of components (Hardware/Software)
- Hands on experiments with Arduino/ARM Interface
- Programming & interfacing with Sensors
- Parallel Programming using OPENMP, OpenMPI & CUDA
- Programming on HPC Interfaces
- Innovation Project

References:

1. *Computer System Architecture*, Morris Mano, Pearson Education, 2008

2. *Computer Systems Architecture: a Networking Approach*, Rob Williams, Pearson Education, 2006
3. *Advanced Computer Architecture: Parallelism, Scalability, programmability*, K. Hwang, McGraw Hill, 1996

IV.3 Software Engineering [Theory] [Semester IV] [3]

Introduction – Software Lifecycle – Software Design Patterns – Development – Costing – Planning & Monitoring – Quality – Maintenance – Migration of Software Engineering to Latest Technology Trends – Software Architecture – CASE – Software Engineering for Web Applications

References

1. *Software Engineering*, Ian Sommerville, Addison-Wesley; 9 edition, 2010

2. *Software Engineering: A Look Back and A Path to the Future*, Leveson, Nancy. December 14, 1996

3. *No Silver Bullet.* In Information Processing. Brooks, Frederick, Jr. Edited by H. J. Kugler. North-holland, BV: Elsevia Science Publishers, 1986.

4. *Design pattern: Elements of Reusable Object – Oriented Software,* Gamma, Erich, Richard Helm, Ralph Johnson, and John Vlissides, Addison Wesley, 1995

IV.4 Science, Philosophy, Truth: Impact of technology [Theory] [Semester IV] [3]

Philosophy of Science – Methodology of Science – Science as a pursuit of truth: Theory of falsification by Karl Popper and theory of paradigm shift by Thomas Kuhn – Evolution of science driven technology and technology driven science – Exploring scales - Aristotelian logic – Galileo: the concept of quantitative measurement and physical laws – Newtonian Mechanics and Industrial Revolution – Modern Physics and Quantum Mechanics – Brain, Consciousness and Singularity

References

1. *The Principia: Mathematical Principles of Natural Philosophy*, Isaac Newton, University of California Press, 1999.
2. *Truth and Beauty: Aesthetics and Motivations in Science*, S. Chandrasekhar, University of Chicago Press, 2013
3. *What is life?*, Erwin Schroedinger, Cambridge University Press, 1992.
4. *Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity*, Steven Weinberg, Wiley, 1972
5. *Phantoms in the Brain : Human Nature and Architecture of the Mind* , V. S. Ramachandran, Fourth Estate, 1998.
6. *The logic of Scientific Discovery*, Karl Popper, Routledge, 2005.
7. *The Structure of Scientific Revolution*, Thomas Kuhn, University of Chicago Press, 2012.
8. *The Singularity is Near*, Raymond Kurzweil, Viking Press, 2005

IV.5.1 Understanding Economic Behaviour: The macro level [Theory + Project] [Semester IV] [4]

GDP Measurement Techniques, Classical and Keynesian Theories- Macroeconomic Equilibrium, labor market, product market, Full Employment, Aggregate Expenditure Model, , Role of money and the Government, Monetary and Fiscal Policy, The multiplier effect, Inflation, Exploring the macroeconomics of an open Economy: international Economics; Balance of Payments - The current and capital account; Determining equilibrium output in an open economy - Open economy with flexible exchange rates - Markets for foreign exchange, Factors affecting exchange rates, effects of exchange rates on the economy

References

1. *Macroeconomics,* R. Dornbusch, S. Fischer and R. Startz, McGraw Hill, 11th edition, 2010.
2. *Macroeconomics,* N. G. Mankiw, Worth Publishers, 8th edition, 2012.
3. *Principles of Economics*, K. E. Case, R. C. Fair and S. C. Oster, Pearson Education, 10th Edition, 2011.
4. *International Economics*, Dominick Salvatore, John Wiley & Sons, 2007.
5. *Macroeconomics*, Robert J. Gordon , Prentice-Hall India Limited, 2011

IV.5.2 Digital electronics and logic design [Theory + Project] [Semester IV] [4]

Boolean algebra – Logic Gates – CMOS circuits – PLA - Digital IC families – Combinatorial circuits – Sequential circuits – MSI and PLD components – ADC – DAC – Semiconductor memories – Microprocessor – Assembly Language – I/O Interfacing – Data Transfer Techniques – Finite State Machine - Firmware design

References

1. *Digital Design* - M. Morris Mano, Prentice Hall of India, 2006
2. *Digital Logic Design Principles*, Balabanian, N. and Carlson, B.,John Wiley & Sons, 2001
3. *Digital Fundamentals*, Floyd, T.L., 8th Ed., Pearson Education, 2005

IV.5.3 Genes to Genomes [Theory + Project] [Semester IV] [4]

Mendelian and non-Mendelian inheritance – Gene interaction – Epistasis – Linkage and recombination – Population genetics and diseases – Genomes (Characteristics, Genome mapping techniques, Genome evolution) – Epigenetics – Transposable elements – Coding and non-coding RNA – Gene expression.

References

1. *Introduction to Genetic Analysis*, Griffiths et al., W H Freeman & Company, 10th edition, 2010.
2. *Genomes*, TA Brown, Garland Science, 3rd edition, 2006.
3. *Molecular Biology of the Cell* , Alberts et al., Garland Science, 5th edition 2007.
4. *Biochemistry*, Berg, Tymoczko and Stryer, W H Freeman & Company, Intl edition 2011.
5. *Leninger's Principles of Biochemistry*, Nelson and Cox, W H Freeman & Company, 6th edition, 2012.

IV.6.1 Bringing Companies and clients together: Sales & Marketing management [Theory + Project] [Semester IV] [4]

Concepts – Strategies - Market Research, Environmental Scanning, Industry Analysis, Competitive Intelligence and Implementation - Marketing Mix - Buyer Behavior Models - Marketing Research and trends in Marketing - Demographic, Geographical Psychographic, Behavioral, Market Targeting and Market Selection – Product Development – Pricing – Promotion – Distribution - Advertising and Branding - E-Business Marketing – Retail Management - Recent Issues: Social Marketing, Rural Marketing, Digital Marketing, Viral Marketing, Social Media Marketing, Online Marketing, Green Marketing, Marketing Ethics

References

1. *Marketing,* M. J. Etzel, J. W. Bruce, W. J. Stanton, & A. Pandit, New Delhi: Tata McGraw-Hill, 14th edition, 2010.
2. *Marketing management: a south Asian perspectiv*e, P. Kotler, K. Keller, L. Koshy & M. Jha, New Delhi: Pearson, 13th Edition, 2009.
3. *Marketing management: Global perspective Indian context,* V. S. Ramaswamy, & S. Namakumari, New Delhi: Macmillan, 4th Edition, 2009.
4. *Marketing management,* R. Saxena, New Delhi: Tata McGrawHill, 4th Edition, 2009.

IV.6.2 Digital electronics and logic design – Innovation Lab [Practical + Project] [Semester IV] [4]

Engineering Kitchen Activity [Laboratory]:

- Realization of logic gates through diodes and resistors
- Verification of Boolean algebraic functions through digital IC gates
- Design of half/full adder and sub tractor circuits
- Design of shift registers using flip-flops
- Circuit design and simulation software and EDA
- Innovation Projects

IV.6.3 Flow of information in living systems [Theory + Project] [Semester IV] [4]

Nature of genetic material – Process of information transfer (Replication, Transcription and translation machinery) – Energetics and accuracy of information transfer – Problems of information transfer (DNA damage and repair) – Regulation of informational transfer (transcription factors, operon) – DNA packaging and chromatin structure.

Engineering Kitchen Activity [Laboratory]:

- Agarose Gel Electrophoresis
- SDS-PAGE Electrophoresis
- Polymerase Chain Reaction (PCR)
- Primer design
- Spectrometry
- Analysis of growth curve, molar extinction coefficient, absorption maxima
- Biochemical assays
- Restriction digestion
- Introductory Gene Cloning (Transformation to Ligation).
- Innovation Project

References

1. *Molecular Biology of the Cell* , Alberts et al., Garland Science, 5th edition 2007.
2. *Genomes*, TA Brown, Garland Science, 3rd edition, 2006.

3. *Molecular Cell Biology*, Lodish et al., W. H. Freeman & Company, 7th edition, 2012.

SEMSTER – V

V.1 Algorithms for Computational Mathematics: Numerical Methods [Theory + Practical] [Semester V] [3 + 3]

Solving Nonlinear Equations - Graphical method - Bracketing and Non-bracketing approach. - Bisection, Method of false position, Iterative method, Newton-Raphson method and Secant method - Errors and rate of convergence - Matrix notation of a system of linear equations - Gaussian elimination and Gauss-seidel method – Pivoting - Row-echelon form - LU factorization - Cholesky's method - ill-conditioning – norms - Solution of a system of nonlinear equations –Polynomial interpolation - Forward, Backward and Divided differences - Piecewise linear and Cubic Spline interpolation - Errors in interpolation - Newton-Cotes Integration Formula - Trapezoidal and Simpson's rules - Gaussian quadrature - error formulae - Euler, Modified Euler and Runge-Kutta methods for solution of differential equations - Power method, QR method, Gershgorin's theorem for Eigen Value problems

Engineering Kitchen Activity [Laboratory]

- Writing C/C++ programs for finding root of the equations using Bisection, Newton-Raphson, Iterative and Secant methods
- Writing C/C++ programs for solving system of linear equations
- Writing C/C++ programs for interpolation, forward, backward and divided difference
- Writing C/C++ programs for methods of numerical integration
- Writing C/C++ programs for Euler and Runge-Kutta methods
- Innovation Project

References

1. *Applied Numerical Analysis*, C. F. Gerald and P. O. Wheatly, Pearson Education India, 2007.
2. *Introduction to Applied Numerical Ananlysis,* R. W. Hamming, Dover Publications, 2012.
3. *Elementary Numerical Analysis- An Algorithmic Approach*, S. D. Conte and Carl de Boor, McGraw-Hill, 1980.
4. *Numerical Recipes: The Art of Scientific Computing*, 3rd Edition, William H. Press, Saul A. Teukolsky, William T. Vetterling, Brian P. Flannery, Cambridge University Press, 2007

V.2 Information exchange in computing devices: Data Communication & Networking [Theory + Project] [Semester V] [4]

Communication Channels - Topologies - Networking Applications – Layered Architecture & Models – Network Devices – Error Management – Network Protocols – Network Security & Cryptography – Network Architectures of Enterprise Applications

Engineering Kitchen Activity [Laboratory]:

- Hands on experiment with Network Topologies on LAN/WAN – Wired & Wireless
- Hands on Experiments with Routing Mechanism in Internet and Intranet
- Setting up TCP/UDP applications on Network Devices
- Socket Programming
- Use of Wire shark for Packet Analysis
- Study Security protocols & certificates
- Study of Streaming Applications and Protocols
- Design of Web/Server Based Applications
- Reverse Engineering the Network Protocols
- Innovation Project

References:

1. *Data Communication and Networking*, Forouzan, B.A., Tata McGraw-Hill. 2013

2. *Computer Networking: A Top-Down Approach Featuring the Internet*, Kurose, J.F. and Ross, K.W., 3rd Ed., Addison Wesley, 2004

3. *Computer Networks*, A S Tanenbaum, PHI, IV Ed, 2003

4. *Computer Communication Networks,* W. Stallings, PHI, 1999

V.3 Computer and Brain: Knowledge Discovery and Artificial Intelligence [Theory] [Semester IV] [3]

Data driven reasoning and learning models – Computational Logic and Cognition - Classification - Statistical inferences - Knowledge representation – Role of knowledge in language understanding and analysis – Context awareness – Pattern Recognition - Designing Expert Systems - Biomimetics

References:

1. *Winston, Patrick Henry*, Artificial Intelligence. 3rd ed. Addison-Wesley, 1992.

2. *Kevin P. Murphy and Robert R. Reitano*, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

3. *The Singularity is Near*, Raymond Kurzweil, Viking Press, 2005

V.4 History, culture & civilization [Theory] [Semester V] [3]

The module has to be taught through projects and case studies by adopting information analysis, mathematical and technological insights associated with History, Culture and Civilization

Rebooting history and historical thoughts through technology, math and science perspective, Pre-Internet and Post-Internet analysis of civilization and culture demonstrated through case studies, Spatio-temporal aspects of culture and civilization.

References

1. *Digital_Humanities*, Anne Burdick, Johanna Drucker, Peter Lunenfeld, Todd Presner, Jefferey Schnapp, MIT Press, 2012
2. *Snap to Grid*, Peter Lunenfeld, MIT Press, 2001

V.5.1 Maximizing performance: Human Resource management and Organizational\ Behavior [Theory + Project] [Semester V] [4]

Evolution of the concept of HRM - HR policies, functions and roles – Leadership – Job Analysis, Job Design, Job Description, Job Specification - Recruitment – Training - Performance & potential appraisal - Statutory laws - Individual & Group Behavior- Leadership & power- Dynamics of Organizational Behavior - Employee Welfare and social Security Schemes - Grievance Handling and Redressal Mechanism - Human Resource Information System.

References

1. *Organisational Behavior*, Stephen P. Robins, PHI Learning / Pearson Education, 15th Edition, 2012.
2. *Organisational Behavior*, Fred Luthans, McGraw Hill, 12th Edition, 2005.
3. *Organizational behaviour: Text and Cases,* K. Singh, New Delhi: Pearson education, 2009.
4. *Fundamentals of human resource management,* D. A. DeCenzo, & S. P. Robbins, New York: John Wiley & Sons, 9th Edition 2010.
5. *Industrial relations in India*, R. Sen, New Delhi: Macmillan India, 2nd Edition, 2009.

V.5.2 Embedded Systems Studio - I [Theory + Project] [Semester V] [4]

Microcontroller and Microprocessor – Introduction to RTOS, VHDL, FPGA - Embedded system development (Memory, Interfaces, Peripheral devices, Sensors) – Basic RISC – CISC – I/O Ports – Instructions Sets – Addressing Modes – Clock System - Timers & Counters – Interrupts – ADC- DAC – Assembly Language & Embedded C – Pipeline – ARM & Thumb Instruction Set - Networking for embedded systems – Introduction to robotics and control – Actuators and Drives – Kinematics and motion control – Sensors and Navigation - Internet of Things

Engineering Kitchen Activity [Laboratory]:

- Design and rapid prototyping of embedded system using FPGA
- VHDL and RTOS implementation
- Study and implementation of networking protocols
- Networking using Internet of Things
- Design and fabrication of robots

- Innovation Project

References

1. *Embedded System Design* – Santanu Chattopadhyay, PHI Learning, 2013
2. *Embedded System*– Raj Kamal, TMH, 2008

V.5.3 Biological Networks: from Micro to Macro Niche [Theory + Project] [Semester V] [4]

Inter and intra-cellular networks – Signal transduction in prokaryotes – Metabolic network – neurological networks – Regulatory pathway and components – Blood – Secretion systems in prokaryotes and eukaryotes – Ecosystem dynamics and sustainability – Tree of life and macroevolution.

References

1. *Molecular Biology of the Cell*, Alberts et al., Garland Science, 5th edition 2007.
2. *Molecular Cell Biology*, Lodish et al., W. H. Freeman & Company, 7th edition, 2012.
3. *Biochemistry & Molecular Biology of Plants*, Buchanan et al., Wiley-Blackwell 1st edition, 2002.
4. *Essentials of Ecology*, Begon, Howarth, Townsend et al., Wiley-Blackwell, 2014.

V.6.1 Efficient manufacturing process: Production and Operations Management [Theory + Practical] [Semester V] [3+3]

Concept, Operations strategy, Management of Quality, Statistical Process Control, process Capability analysis and Six Sigma, Concept and framework of Total quality management system, Elements and objective of supply chain management, inventory management: models and applications, Evaluation and Selection of appropriate Production and Operations technology - Forecasting, Strategic Importance of forecasting, Associative Forecasting Methods, Monitoring and Controlling Forecasts, Forecasting in service sector - Computer Integrated Manufacturing Systems.

Engineering Kitchen Activities [Laboratory]:

- Case study discussion on the company's productivity problem from the viewpoints of classical and modern organization theories and linking it with the real life problem.
- Case study discussion on the development of new production techniques which is being practiced in different sectors
- Creating live models which could be tested and used in companies linking mathematical models with the production techniques and strategies.
- Innovation Project

References

1. *Production and Operations Management*, K. Aswathappa K and K. S. Bhat, Himalaya Publishing House, 6th Edition, 2010.
2. *Production and Operations Management*, R. Pannerselvam, Prentice Hall India, 3rd Edition, 2013.
3. *Operations Management*, N. Gaither and G. Frazier, South Western Cengage Learning, 2006.

V.6.2 Signals & Systems Engineering [Theory + Practical] [Semester V] [3 + 3]

Discrete-time systems - Continuous-time systems - Laplace transforms – Z transforms – Convolution – Frequency response – Fourier series and transform – Feedback – Sampling – Modulation – Filters design techniques

Engineering Kitchen Activity [Laboratory]:

- Study of Convolution types.
- Computation of DFT & IDFT using DSP Processors
- FIR & IIR Filter Implementation using the DSP Processors.
- MATLAB implementation of different signal types
- Sampling theorem and reconstruction of signal from its samples using natural sampling
- Innovation Project

References

1. *Signals and Systems.* Oppenheim, Alan, and Alan Willsky. 2nd ed. Prentice Hall, 1997.

2. *Signals and Systems 2 Ed.,* Haykin, S. & Van Been, *B.*, John Wiley & Sons, 2007.

V.6.3 Applied Genomics and Proteomics: Methods and techniques [Theory + Practical] [Semester V] [3 + 3]

Recombinant DNA technology – Artificial chromosome – PCR and its types – DNA and Protein sequencing – Microarray – MALDI – RAPD – RFLP – *in situ* hybridization – Site-directed mutagenesis – Gene transfer and gene therapy – Electrophoresis – Spectrometry – X-ray crystallography – NMR – Genomic and cDNA library – Two hybrid systems – Plant and Mammalian tissue culture.

Engineering Kitchen Activity [Laboratory]:

- Agarose Gel Electrophoresis
- SDS-PAGE Electrophoresis
- Polymerase Chain Reaction (PCR)
- Primer design

- Spectrometry
- Analysis of growth curve, molar extinction coefficient, absorption maxima
- Biochemical assays
- Restriction digestion
- Introductory Gene Cloning (Transformation to Ligation).
- Innovation Project

References

1. *Molecular Cloning: A Laboratory Manual*, Green and Sambrook, Cold Spring Harbor Laboratory Press, 4th edition 2012.
2. *Principles and Techniques of Biochemistry and Molecular Biology*, Wilson and Walker, Cambridge University Press, 7th edition 2010.

SEMSTER – VI

VI.1 Linear Construction of Actions: Engineering through Linear Programming and Game Theory [Theory + Project] [Semester VI] [4]

Formulation of Linear Programming Models - Theory of simplex method - optimality and unboundedness - the simplex algorithm - simplex method in tableau format - Computational efficiency of the technique - Introduction to artificial variables – two-phase method, Big-M method and their comparison - Formulation of the dual problem, Primal-dual relationships, Economic
interpretation of the dual - Introduction to Post optimality analysis - Dual Simplex Method and its application - Formulation of the Transportation problem - Algorithm for solving transportation problem - Northwest - corner method, least cost method and Vogel approximation method for determining the starting basic solution - Assignment problem and its mathematical formulation,-Hungarian method for solving assignment problem - Formulation of two person zero sum games - Solving two person zero sum games - Games with mixed strategies - Graphical solution procedure -Linear programming solution of games

References

1. *Linear Programming and Network Flows,* Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, (2nd edition), John Wiley and Sons, India, 2004.

2. *Introduction to Operations Research,* F. S. Hillier and G. J. Lieberman, (9th Edition), Tata McGrawHill, Singapore, 2009.

3. *Operations Research, An Introduction,* Hamdy A. Taha, (8th edition), Prentice-Hall India, 2006.

VI.2 Computer Graphics and Visualization Architecture [Theory + Practical] [Semester VI] [3 + 3]

Display devices – Transformation algorithms – Ray Tracing and shading – Camera and image formation – Computer and machine vision – Object recognition and processing – Motion Capture & Analysis – Data Visualization Techniques – Animations – Virtual Reality and Augmentation

Engineering Kitchen Activity [Laboratory]:

- 2D and 3D transformation modeling
- Concept of Animations and Motion Pictures
- Smart Interfaces
- Virtual Augmentation applications in security, medicine and manufacturing
- Indexing and retrieval of video databases

- Innovation Project

References:

1. *3D Computer Graphics*. Watt, Alan, Addison-Wesley, 1999.

2. *Fundamentals of Computer Graphics*. Shirley, Peter, Michael Ashikhmin, Steve Marschner, 3rd ed. A K Peters/CRC Press, 2009.

3. *The Illusion of Life – Disney Animations,* Frank Thomas, Ollie Johnston, Walt Disney, 1981

VI.3 Advanced Algorithm Design [Theory] [Semester VI] [3]

Advanced data structure – Geometric algorithms – Graph algorithms – Linear Programming – Search heuristics – Approximation algorithms – Compression and streaming algorithms – Distributed and parallel algorithms

References:

1. *Randomized Algorithms*, Motwani and Raghavan,. Cambridge, UK: Cambridge University Press, 1995.

2. *The Art of Computer Programming,* Vol. 1,2,3,4. Donald E. Knuth, Pearson Education, 2013

3. *Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology,* Gusfield, Dan,. Cambridge, UK: Cambridge University Press, 1997.

4. *Online Computation and Competitive Analysis*, Borodin, Allan, and Ran El-Yaniv, Cambridge, UK: Cambridge University Press, 1998.

5. *Approximation Algorithms for NP-Hard Problems,* Hochbaum, Dorit, ed.. Boston, MA: PWS Publishing Company, 1997.

VI.4 Art & Design [Theory] [Semester VI] [3]

Exercises in design to understand principles of design - Distribution of space - Language of proportion and the process of form synthesis – Introduction to orthographic projections in simple positions – Drawing of plan, elevation and section of simple objects to scale, full size, reduced or enlarged – User interface and user experience design elements – Affective Computing in Interface Designs

References

1. *Design Basics*, David Lauer, Stephen Pentak, Cengage Learning, 2011
2. *A Textbook of Geometrical drawing,* William Minifie, W.M. Minifie & Company, 1845 (Paperback reprinted in 2007)

VI.5.1 Handling money: Finance management [Theory + Project] [Semester VI] [4]

Basic Concepts of Finance, Investment decisions, financing and dividend decision, working capital management, long term sources of finance, strategic financing decisions, online Financial Management, Global financial information using Information Technology.

References

1. *Financial Management*, V. K. Bhalla, New Delhi: Anmol Publications, 2009.
2. *Fundamentals of financial Management*, E. F. Brigham, & J. F. Houston, USA: Thomson, 11th Edition, 2007
3. *Financial management, Text, Problems and cases*, M. Y. Khan and P. K. Jain, Tata McGraw Hill, 5th Edition, 2008.
4. *Financial Management*, I. M. Pandey, Vikas Publishing House Pvt. Ltd., 10th Edition, 2007.

VI.5.2 Embedded systems studio – II [Theory + Project] [Semester VI] [4]

VHDL Language - Concurrent and Sequential Assignment – Hardware specification - FPGA Architecture – Design of advanced robotic systems and embedded devices for varied applications – Virtual Reality and Computer Vision - Sensors Network: Wired and Wireless – Interfacing of various sensors – PID Controller - Vision Robotics – MEMS – Biomedical Sensors – Applications

References

1. *Robot Analysis and Control*, Asada, H., and J. J. Slotine. New York, NY: Wiley, 1986

2. *Learning in Embedded Systems,* Leslie Pack Kaelbling.. MIT Press, 2008

VI.5.3 Biodefense and Bioengineering [Theory + Project] [Semester VI] [4]

Emerging pathogens and host-pathogen interactions – Autoimmune diseases – Receptor Biology – Cancer and Tuberculosis – Antigen processing – Antibody synthesis and secretion – Viruses and Bacteria – Microbial growth kinetics – Secondary metabolites in plants – Innate immunity in insects and plants – Toll Receptors – Engineered single chain antibody.

References

1. *Kuby Immunology*, Owen and Punt, W. H. Freeman & Company, 7th edition, 2013.
2. *Microbiology: an introduction*, Tortora et al., Benjamin Cummings, 11th edirtion 2012.
3. *Biochemistry & Molecular Biology of Plants*, Buchanan et al., Wiley-Blackwell, 1st edition 2002.
4. *The Biology of Cancer,* Robert Weinberg, Garland Science, 2nd Edition 2013.
5. *Immunology and Immunotechnology*, Ashim K Chakravarty, , O.U. P, 1st edition, 2006.

VI.6.1 Business: Organization and Strategy [Theory + Practical] [Semester VI] [3 + 3]

Foundation of e-business and e-commerce, organizational models, role of Information Systems in Business, various approaches in ICT Systems, Emerging models in e-business, e-business and organizational changes, productivity and industries transformations, Perspectives and requirements for starting online business, Processes associated with managing website development ICT in B2B: Business models, revenues and sources, performance trends, e-business and organization management, Internet Marketing and e-Tailing.

Engineering Kitchen Activities [Laboratory]:

- Case study discussion on real life cases of the companies that exploited the competitive advantage of IT to leverage their growth and expansion.
- Management quiz on the recent updates of the happenings in the e-business market scenario.
- Case study discussion on the development of new e-business which emerged out of market space and other concepts.
- Innovation Project

References

1. *Internet Business Models and Strategies: Text and Cases*, A. Afuah and C. L. Tucci, McGraw-Hill., 2003.
2. *Information Technology and the Corporation of the 1990s: Research Studies*, T. J. Allen and M. S. Morton, Oxford University Press, New York 1994.
3. *Strategies for e-Business: Creating Value through Electronic and Mobile Commerce*, T. Jelassi and A. Enders, Prentice Hall, 2005.
4. *Competitive Advantage: Creating and Sustaining Superior, Performance*, Michael E. Porter, The Free Press, New York, 1985.
5. *E-Learning Tools and Technologies*, Horton and Horton, Wiley Publishing, 2003.

VI.6.2 Control Systems [Theory + Practical] [Semester VI] [3 + 3]

Introduction to Control Systems - Analysis and design objectives - The design process - Classification and modeling of control systems – Modeling in the frequency domain - Modeling in the time domain - Time response - Reduction of multiple subsystems - Signal flow graphs - Mason's rule. Stability - Routh Hurwitz Criterion - Steady state errors - Root locus techniques - Design via Root Locus - Frequency Response Techniques - Design via Frequency Response- Design via state space - Digital Control Systems – Non-linear analysis.

Engineering Kitchen Activity [Laboratory]:

- Designing the model of a DC motor.
- Design of controllers for speed and position control
- Compensator design
- State space model design.
- Design of temperature controller.
- Innovation Project

References

1. *Control Systems Engineering, 6th Edition*, Norman S Nise, Wiley, 2011.
2. *Linear Control Systems With MATLAB Applications, 11th Edition,* B. S. Manke, Khanna Publishers, 2013
3. *Discrete-Time Control Systems,* K. Ogata, Prentice Hall, 1995.
4. *Control Tutorials for MATLAB and Simulink,* W. Messner and D. Tilbury, Addison-Wesley, 1998.

VI.6.3 *in silico* Biology [Theory + Practical] [Semester VI] [3 + 3]

Sequence analysis and alignment – Promoter domains and motifs – Scoring matrices – Biological databases and data-mining – Phylogeny and cladistics – Structure analysis – Molecular modelling and simulations – Bio-statistics – Stochastic models – Algorithm and programming language.

Engineering Kitchen Activity [Laboratory]:

- Sequence analysis (BLAST, FASTA).
- Database (NCBI, DDBJ, EMBL).
- Motif and Promoter searches (e.g. CD-Search, SMART, SignalP).
- Phylogenetic analysis (PHYLIP, MEGA).
- Protein interaction (STRING, BioGRID).
- Protein structure, Function (PROSITE programs, Chimera.
- Gene expression, function (GEA, Gene card, OMIM).
- Innovation Project

References

1. *Bioinformatics: Sequence and genome analysis*, David mount, Cold Spring Harbor Laboratory Press; 2nd edition, 2013.
2. *Introduction to Bioinformatics*, Arthur M. Lesk, OUP Oxford, 4th edition, 2014.

SEMSTER – VII

VII.1 Fluidity in nature: computational interpretations [Theory + Project] [Semester VI] [4]

Polar, spherical, cylindrical, Moving and Rotating coordinate systems - Generalized coordinates - Basic equations of fluid dynamics – Conservation of mass, momentum and energy - Mathematical nature of the flow equations and their boundary conditions - Numerical solution of Navier-Stokes equations - Finite difference method - Its application over first order and second order differential equations - Shortcomings of finite difference method - Weak forms of the differential equations -Finite element method - Its shape functions over one dimensional and two-dimensional geometries - Stiffness matrices - Assembly of stiffness matrices over all the elements - Solution of assembled system of equations after applying boundary conditions - Shortcomings of Finite element method.

References

1. *The finite element method in Heat Transfer and Fluid Dynamics,* J. N. Reddy and G K Gartling, CRC Press, 2010
2. *An introduction to the finite element method*, J. N. Reddy, McGraw-Hill Company, New York, 2006
3. *Applied Mathematics*, J David Logan, John Wiley, New Jersey, 2013.
4. *Classical Mechanics with MATLAB Applications*, Javier E. Hasbun, Jones and Bartlett, 2010.

VII.2. Computer Language Design & Engineering [Theory] [Semester VII] [3]

Micro programming - Function and structure of compilers – Lexical analyzer – Tokens – Parsing – Type system – Run time environment – Code generation and optimization – Intro Optimization – XML parser

References:

1. *Engineering a Compiler*, Cooper, K.D. and Torczon, L., MorganKaufmann. 2012
2. *Parsing Techniques: A Practical Guide*, Dick Grune, Ceriel J.H. Jacobs, Springer, 2007
3. *Compilers: Principles, Techniques and Tools*, by Aho, Sethi, Ullman, Addison-Wesley Pub Co, 1986.

VII.3 Software Project Management [Theory + Practical] [Semester VII] [3 + 3]

Software Design – Project management – Software Management Process Framework – Software Project Management – Quality (CMMI) & Risk Management – Evaluation & Forecasting - Present Frameworks and Strategies

Engineering Kitchen Activity [Laboratory]:

- Analysis of a desktop/enterprise Software Applications under lens of software design fundamentals
- Requirement gathering, verification and specification of a new Software Project
- Creating Prototypes and outlines of problems in the frame of Software engineering aligned with design methodologies
- Reverse engineering any Open Source Software Project and identify Software management aspects
- Software Projects sign off with Project Charter and management of project plans
- Hands on Experiment on Requirement Management, Deliverable attributes of Software projects
- Design a Software Application, Product, and Service and integrate with existing systems
- Estimation of Costing of Software, Time sheet management in estimation of Effort, Resource Management
- Design of User Guides, Software Manuals, Update Documentation, Release Guides, Deployment Guides, FAQs
- Basic Understanding on use of Agile & Scrum
- Innovation Project

References:

1. *Requirements Risks Can Drown Software Projects*, Leishman and Cook, Computer (November 2001)
2. *Software Engineering: A Look Back and A Path to the Future*. Leveson, Nancy, December 14, 1996.
3. *Applied Software Project Management*, Andrew Stellman & Jennifer Greene, O`Reilly, 2005

VII.4 Visual Arts & Aesthetics [Theory] [Semester VII] [3]

Introduction to media art, computer art, digital art and interactive art - Aesthetic strategies in processual art - Art, technology and society - Interaction as aesthetic experience - Aesthetic of interaction in digital art - Aesthetic and new media - Interpreting visualizations : : Visualizing interpretations - Case studies

References

1. *Aesthetics of Interaction in Digital Art*, Katja Kwastek, MIT Press, 2013
2. *Graphesis: Visual forms of knowledge production*, Johanna Drucker, Harvard University Press, 2014.
3. *SpecLab: Digital Aesthetics and Projects in Speculative Computing*, Johanna Drucker, University of Chicago Press, 2009

VII.5.1 Environment Management [Theory + Project] [Semester VII] [4]

Environment Impact Assessment, Sustainable Development and Millennium Development Goals - Urbanization and its hazards, Urban Planning and Growth - Central Place Theory Geometry and Ordering, Burgess Model for City Planning, Growth Pole and Growth Centre Theory, Demographic Transition Model - Waste Management, Environmental management tools and techniques of sustainable development, Eco system Modeling, Environmental Information System – Environmental Laws.

References

1. *Environmental Management: Principles and Practice (Routledge Environmental Management Series)*, Chris Barrow, Routledge, 2003.

2. *Environmental Management in Organizations: The IEMA Handbook*, John Brady, Alison Ebbage and Ruth Lunn, Earthscan, Washington, DC. 2011.

3. *Essentials of Environmental Management*, Paul Hyde and Paul Reeve, IOSH Services Ltd. (U. K.), 2004.

4. *Textbook of Environmental Studies*, Erach Bharucha, UGC

VII.5.2 Engineering at Molecular Scale: Devices and Nanotechnology [Theory + Project] [Semester VII] [4]

Optical devices, electronic devices, liquid crystal and magnetic devices and their functionality- Spintronic devices (including spin valves and MRAM devices) - Nanoscale semiconductor electronic devices - CMOS at sub-15nm gate length, Carbon nanotubes, III-V and wide-bandgap devices - Devices for quantum computing -Nanoscale photonic devices - Basic properties of liquid crystals - Molecular properties of the organic materials and their use in current production and research level electronic devices - Thin Films Growth and Epitaxy, Characterization of Nanomaterials, Introduction to Sensor Technology - CMOS scaling challenges at nanoscale regimes - Device technologies for sub 100nm CMOS - Device scaling and ballistic MOSFET - Nanoscale CMOS design, Nanoscale circuits - Non classical CMOS.

References

1. *Nanotechnology for Electronic Materials and Devices,* Korkin, A.; Gusev, E.; Labanowski, J.K.; Luryi, S. Springer, 2007

2. *Electronics Composite -Modeling, Characterization, Processing, and MEMS Applications*-Minoru Taya, Cambridge University Press,2008

3. *Nanotechnologies for Future Mobile Devices* - Tapani Ryhänen, Mikko A. Uusitalo, Olli Ikkala, Asta Kärkkäinen, Cambridge University press, 2010

4. *High-Speed Heterostructure Devices From Device Concepts to Circuit Modeling* - Patrick Roblin, Hans Rohdin, Cambridge University press, 2006

VII.5.3 Modeling and Simulating Brain Functions: Computational Neuroscience [Theory + Project] [Semester VII] [4]

Introduction to Neurobiology – Integrative Physiology (whole organism and population) Cognitive and neural modelling – Single Neuron Model – Neural models (vision, memory function, rhythm) – Synapse and networks – Neural plasticity and computational learning – Neural coding – Artificial intelligence – Neural imaging.

References

1. *Theoretical Neuroscience: Computational and Mathematical Modeling of Neural Systems,* Peter Dayan and Larry Abbott, MIT Press 2005.
2. *Fundamentals of Computational Neuroscience*, Thomas Trappenberg, Oxford University Press; 2nd edition, 2010.

VII.6.1 Business automation strategies. ERP. Case studies and project in industry [Theory + Practical] [Semester VII] [3 + 3]

Business Process modeling, Process Metrics, Overview of Enterprise systems and Business Processes, Identify and understand the functionalities in an ERP system, issues of ERP architecture, design development, Performance & Capabilities Gaps, Business Process mapping & redesign, , Advanced ERP modules, Industry specific case study, Project implementation.

References

1. *Modern ERP Systems: Select, Implement and Use Today's Advanced Business Systems,* Bradford, M. (2010).. 2nd Edition, Lulu.

2. *ERP to E²RP A case Study Approach*, Desai, S., Srivastava, A. (2013). Eastern Economy Edition: PHI Learning Private Limited.

3. *Essentials of Business Processes and Information Systems*, Magal S., Word J., John Wiley & Sons, 2009.

4. *Enterprise Integration,* Sandoe K., Corbitt G., Boykin R., John Wiley & Sons, 2001.

VII.6.2 Circuit Analysis and Synthesis [Theory + Practical] [Semester VII] [3 + 3]

Basic circuits analysis - Ohm's Law - Kirchoffs laws - DC and AC Circuits - Resistors in series and parallel circuits -Mesh current and node voltage method of analysis for D.C and A.C. circuits - Phasor Diagram - Power, Power Factor and Energy - Network reduction and network theorems for dc and ac circuits - voltage and current division, source transformation - star delta conversion - Thevenins and Nortons Theorem - Superposition Theorem - Maximum power transfer theorem - Reciprocity Theorem - Resonance and coupled circuits – Series, parallel resonance and their frequency response - Quality factor and Bandwidth - Self and mutual inductance - Coefficient of coupling - Tuned circuits - Single tuned circuits- Transient response for DC circuits - Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input - Characterization of two port networks in terms of Z,Y and h parameters. Three phase circuits -Three phase balanced / unbalanced voltage sources - Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced - Phasor diagram of voltages and currents - power and power factor measurements in three phase circuits.

Engineering Kitchen Activities [Laboratory]:

- Verification of nodal voltage and mesh current methods for solving circuits.
- Verification of important network theorems.
- Study of the response of the first order R-C and R-L circuits.
- Study of the response of a series and a parallel RLC circuits.
- Innovation Project

References

1. *Linear circuits: analysis and synthesis* - Ayyagari Ramakalyan, Oxford University Press, 2005,
2. *Linear circuit analysis* - Chi Kong Tse, Addison-Wesley, 1998

VII.6.3 Systems Biology [Theory + Practical] [Semester VII] [3 + 3]

Biological complexity – Biological circuits – Thermodynamics – Bio-physical properties of macromolecules – Bio-molecular interaction analysis – Developmental biology – Data integration and hypothesis generation – Reversible reactions and feedback loops – Transient networks, Behavioral network – Instinct and Learning.

Engineering Kitchen Activity [Laboratory]:

- Gene Regulation/interaction networks models and software (KEGG, CYTOSCAPE). Intercellular signaling network and software.
- Biochemical & thermodynamics properties of Protein – Protein Modeling software.
- Large scale data analysis (high-throughput).

- Molecular markers.
- Deriving mathematical equations from biological phenomenon.
- Innovation Project

References

1. *An Introduction to Systems Biology: Design Principles of Biological Circuits*, Uri Alon, Chapman & Hall, 2nd edition 2013.
2. *A First Course in Systems Biology*, Eberhard Voit, Garland Science; 1 edition, 2012.
3. *Handbook of Systems Biology: Concepts and Insights*, Marian Walhout, Marc Vidal, Job Dekker (Edited), Academic Press; 1st edition, 2012.

COURSE STRUCTURE & SYLLABUS
B.A. Honours (Humanities & Social Sciences)
Cluster Innovation Centre, University of Delhi, Delhi – 110007

Semester I

Paper Title		Paper Code	Credits
Introduction to Humanities & Social Sciences	Core	912101	6
Impact of Technology: Philosophical Implications	Core	912103	6
Research Methodology	Core	912106	6
Art of Communication	AECC	912102	4
TOTAL CREDITS - SEM I			22

Semester II

Paper Title		Paper Code	Credits
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
Paper in project mode at CIC	Main_OP	912201	6
Environmental Studies	AECC	912107	4
TOTAL CREDITS - SEM II			28

Semester III

Paper Title		Paper Code	Credits
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
Paper in project mode at CIC	Main_OP	912301	6
Introduction to Documentary – Technologies & Techniques	SEC	912302	4
Appreciating Literary Works	SEC	912303	
Computer Applications in Humanities & Social Science Research	SEC	912304	
An Introduction to GIS & GPS	SEC	912305	
TOTAL CREDITS - SEM III			28

Semester IV

Paper Title		Paper Code	Credits
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
To be chosen by students in College	Core/GE/DSE	-	6
Paper in project mode at CIC	Main_OP	912401	6
Documentary Filmmaking	SEC	912402	4
Legal Literacy	SEC	912403	
Film Appreciation	SEC	912404	
Translation	SEC	912405	
TOTAL CREDITS - SEM IV			28

Semester V

Paper Title		Paper Code	Credits
To be chosen by students	Core/GE/DSE	-	6
To be chosen by students	Core/GE/DSE	-	6
To be chosen by students	Core/GE/DSE	-	6
Paper in project mode at CIC	Main_OP	912501	6
TOTAL CREDITS - SEM V			24

Semester VI

Paper Title		Paper Code	Credits
Introduction to Digital Humanities	Core	912601	6
Innovation Management	Core	912602	6
Theoretical Debates in Humanities & Social Sciences	Core	912605	6
Art & Design	DSE	912604	6
Counseling			
Historical Tourism in India			
Journalism			
TOTAL CREDITS - SEM VI			24

Note: 1. Semester I and VI to be studied at CIC

2. For semesters II to V students will have to opt Core/Elective/DSE courses from different colleges under meta-college concept.

3. Projects and SECs will be taught at CIC

SYLLABUS

Introduction to Humanities & Social Sciences

Sem I | Core | 6 Credits | 912101

Learning Objectives: Students will be:

- Exposed to fundamental and methodological issues in Humanities & Social Sciences.
- Introduced to the expanse of the field of Humanities and Social Sciences.
- Able to develop critical thinking with respect to identifying interlinkages between various disciplines of social sciences and humanities.
- Encouraged to use a variety of disciplines to find a solution to social problems.

Learning Outcomes: A student will:

- Understand the concept and scope of merging and evolving disciplines.
- Be equipped with adequate knowledge to integrate various disciplines and apply them to solve individual & social issues.
- Be able to frame a comparative context through which they can critically assess the ideas, forces, movements and values that have created the modern world.

Unit I: Concepts, Approaches, Scope & Recent Research Trends

- Concepts and scope
- Multi-disciplinarity, inter-disciplinarity & trans-disciplinarity – scope & impediments
- Approaches to studying Humanities & Social Sciences
- Recent Research trends in Humanities & Social Sciences

Unit II: Understanding Humanities as a discipline

- Emergence & growth of Humanities as a discipline
- Exploring basic themes of Humanities
- Constituent disciplines
- Humanities as a way of life

Unit III: Understanding Social Sciences as a discipline

- History & development of Social Sciences as a discipline
- Constituent disciplines
- Social Sciences in contemporary world

Unit IV: Emerging in Humanities & Social Sciences (Any Two)

- Peace & Conflict Studies –concept, inter-disciplinarity of peace and conflict studies, theories of conflict and causes of conflict.
- Cultural Studies – understanding culture, inter-disciplinarity of cultural studies, basic paradigms, learning basic strategies for connecting culture knowledge to everyday life, e.g., high culture, cross-culture, popular culture, etc.
- Religion, culture & society – construction of religion, basic tenets of religion studies, psychology & religion, society & religion, culture & religion, gender, sex & religion, religion & secularism.
- Development Studies – concepts & core elements, inter-disciplinarity of development studies, approaches to development studies.

Unit V: Project

References: Because of the nature of the paper, readings will include articles, excerpts, documentary/film screenings, and other sources to be given as per needs for Unit IV.

1. Allen F. Repko, William H. Newel & Rick Szostak (2012). Case Studies in Interdisciplinary Research. Sage Publications.
2. Allen F. Repko (2008). Interdisciplinary Research: Process and Theory.
3. Dennis J. Sporre (2011). Perceiving the Arts: An Introduction to the Humanities, 10th Edition.
4. Frank J. Zulke & Jacqueline P. Kirley (2002). Through the Eyes of Social Sciences (6th ed). Waveland Press
5. Hunt, E. F. & Colander, D. C. (2016). Social science: An introduction to the study of society (14th ed.). Boston: Pearson/Allyn and Bacon.
6. Richard Paul Janaro & Thelma C. Altshuler (2011). The Art of Being Human: Humanities as a Technique for Living Person. Pearson Publication.

*****

SYLLABUS

Impact of Technology: Philosophical Implications

Sem I | Core | 6 Credits | 912103

Course Description: This course is designed to help students to acquire a critical understanding of:

(a) Fundamental questions, concepts and developments within the philosophy of technology
(b) Chronological development of technology
(c) The way that technology works to shape human experience and well-being
(d) The ethical and social implications of science & technology

1. Technology: Meaning, Concept and Development

Introduction: Definitions of Technology; Concept of technological development; development of technology

Philosophy and Technology: Relationship between Philosophy & Technology; Technology, Science and God

2. Development of Science & Technology in History:

Stone Age; Bronze Age; Emergence of Ancient Civilizations Birth of Intellectual Concepts & Ideas; Second Phase (Near East, Greek World; China); Science in Middle Ages

Birth of Modern Science: Renaissance; Enlightenment; Industrial Revolution; Advances in Modern Science in 20th century

History of Science & Technology in India: Ancient India; India's contribution to Science; Great Indian Scientists; Current stage of technological development

2. Technology and human well-being

Impact of Technology: Agriculture, Industry, Economy, Human Well-being, Transport, Military, Culture & environment

3. Philosophical, ethical and social implications of contemporary and emerging technologies

Space Technology: Development and Advances in Space Technology; Philosophical Issues in Space Technology**;** Indian Space Technology

Computer Technology: Evolution of Computers **;** Role of Computers in Contemporary Life**;** Future of Computer Technology; Internet in Everyday Life; Social Networking (Digital Footprints); Ethical and Political Issues in Search Engines

Nanotechnology & its Ethical & Social Implications: Meaning and Scope of Nanotechnology; Role of Nanotechnology in Human Development; Nanoscience and Nanoethics

Genetic Engineering: Human Genome Project; Philosophical and Ethical Issues in Genetic Engineering

Biotechnology: Human Cloning; Social Implications of Biotechnology

Robotics, Human Enhancement & Beyond: Role of Robotics in Human Enhancement; Future of Humanity; Ethics of Robotics

Future Technologies: Technology for Sustainable Energy and Ecology; Technology and the Future of Humanity; Limits of Science & Technology

Suggested Readings

1. Boersema, David. *Philosophy of Science*. Pearson Prentice Hall, 2008.
2. Bose, D M et al. *A Concise History of Science in India.* INSA, New Delhi, 1971
3. Dusek, Val. *Philosophy of Technology: An Introduction.* Blackwell Publishing, 2006
4. Heisenberg, W. *Physics and Philosophy: The Revolution in Modern Science.* London, 1959.
5. Hess, Davis J. *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artefacts.* Columbia University Press, New York, 1995.
6. Kumar, Deepak. *Science and the Raj.* Oxford, New Delhi, 1995.
7. Menon, R V G. *An Introduction to History and Philosophy of Science.* Pearson, New Delhi, 1912.
8. Parmeswaran, Uma. *C. V. Raman: A Biography.* Penguin, New Delhi, 2011

*****

SYLLABUS

Research Methodology

Sem I | Core | 6 Credits | 912106

Objectives

- to make students understand the significance of research
- to introduce the students to the meaning and objectives of research
- to acquaint students with different tools and methods of data collection and analysis.

Learning Outcomes

- After studying this course students will be able to analyse their observations for presentation and publication.
- Students will be able to develop skills required for a good research and project work.
- It will help in developing critical thinking and innovative ideas.

(Note: Each Unit will be taught through related practicals)

Unit I: Introduction

Suggested Practicals/Exercises: (1) Conduct an Interview of your family member/ friend/ neighbour etc. (2) Find the causes of the parking problem in your colony.

- Meaning, Objectives and Significance of Research
- Types of Research; Research Methods and Methodology
- Approaches and Perspectives in Research
- Ethics of Research
- Problems Encountered by Researchers

Unit II: Research Problem and Hypothesis

Suggested Practicals/Exercises: (1) Prepare a list of the issues or topics of social significance, environmental concerns etc. (2) Prepare a list of questions raised from one or two of the selected topics and your ideas to address them.

- Definition and Statement of a Research Problem
- Selecting the Problem and its Evaluation
- Hypothesis – Definition and Formulation
- Testing of Hypothesis and its Limitations

Unit III: Data Collection: Types and Sources

Suggested Practicals/Exercises: (1) Make a list of the various kinds of sources used for the study of any issue of interest. Classify them according to the nature and form of the source (e.g. literary- archival, census etc.; archaeological, oral, etc.) (2) Tabulate the qualitative and quantitative traits of your classmates (e.g. height, weight etc. and behavioural pattern like level of anger, intelligence etc).

- Types of data – Primary and Secondary; Qualitative and Quantitative
- Sources of Data
    - Qualitative Data (Literature, Texts, Archival Records, Documents, Volumes, Archaeological Remains etc.)
    - Quantitative Data (Observations, Interviews, Questionnaires, Narratives etc.)

Unit IV: Tools and Techniques of Data Collection

Suggested Practicals/Exercises: (1) Determine the Sample Size of a given population (e.g. classroom, university) and give reasons. (2) Make a sample design for collection of data regarding the academic satisfaction of undergraduate students of Delhi University using some variables.

- Sampling Design & Sample Size
- Types of Sampling
- Types of Data Collection: Survey; Experimental; Observation; Interview; Questionnaire methods.

Unit V: Analysis and Interpretation of Data

Suggested Practicals/Exercises: (1) Tabulate the matrimonial data of one major Newspaper using suitable computer applications (e.g. Excel & SPSS). (2) Take an interview of your grandparents/ parents/uncles and analyse the qualitative information.

- Quantitative Analysis (Statistical Analysis, Graphical Analysis)
    - Tabulation and graphical representation
    - Central tendency; dispersion; correlation; regression
    - Testing of hypothesis
- Qualitative Analysis
    - Discourse Analysis
    - Content Analysis
    - Narrative Analysis
- Computer Application for Research
    - Word Processing
    - Presentation tool
    - Use of internet and e-resources
    - Use of Excel and SPSS

Unit VI: Field Techniques

Suggested Practicals/Exercises: (1) Students will be divided into groups and each group will be asked to present the experiences of the problems of the locality where they live and also about the issues of newer/other areas on the basis of secondary sources. They will be asked to differentiate between the observation as direct participants and that as outsiders.

- Role, value and ethics of field-work
- Defining the Field and identifying the Case Study (Rural/Urban/Human/Cluster etc.)
- Field Techniques and Tools – Selection, Merits and Demerits

Unit VII: Research Report Writing

Suggested Practicals/Exercises: (1) Write a review of any movie you have watched or of a book you have recently read. (2) Prepare a brief research report on any topic of your interest keeping in view the structure of a research report (introduction, objectives, methodology, conclusion). (3) Make a power point presentation on the report prepared by you.

- Types and Structure of Research Reports
- Documentation and the issues of Plagiarism and Copyright
- Presentation of research: Oral and written (abstracts/synopsis)

Suggested Readings

English

- Bell, Judith. *Doing your research project: A Guide for First-time Researchers in Education, Health and Social Sciences.* (Fourth Edition). England: Open University Press, 2005.
- Guthrie, G. *Basic Research Methods: An Entry to Social Science Research.* Sage Publications, 2010.
- Kaul, Lokesh. Methodology of Educational Research. New Delhi: Vikas Publishing House, 1986.
- Kothari, C.R. *Research Methodology: Methods and Techniques*. New Delhi: Wiley and Eastern Ltd. 2008.
- Kumar, Ranjit. *Research Methodology: A Step-by-Step Guide for Beginners* (Third Edition). Sage Publications, 2011.
- Mukherjee, Neela. *Participatory Learning and Action with 100 Field Methods.* New Delhi: Concept Publication, 2002.
- Thomas, G. *How to do your Research Project.* Los Angles: Sage Publication, 2009.
- Wolcott, H. *The Art of Fieldwork.* Alta Mira Press, Walnut Creek, CA, 1995.

Hindi

- Sharma, Vinayamohan. *Shodh Pravidhi,* Mayur Paperbacks, Delhi, 2006
- Sinha, Savitri. *Anusandhan ka Swaroop.,* Aatmaram & Sons, Delhi, 1954
- Sinha, Savitri and Vijyendra Snatak. *Anusandhan ki Prakriya.* National Publishing House, New Delhi, 1969

*****

SYLLABUS
Art of Communication
Sem I | AECC | 4 Credits | 912102

OBJECTIVES:

- To explore the meaning and dynamics of communication as a process
- To introduce fundamental communication skills
- To understand the relevance of communication in different settings
- To delve into the potential influences on process of communication

LEARNING OUTCOMES:

- Carving effective communicators
- Skill based learning and facilitation
- Enhanced understanding of expression as an art of communication
- Developing customized pedagogy for communication
- Implementing technological advancements in daily communications

1. **Introduction to communication**

   Suggested practicals/exercises

   - Meaning
   - Theories of communication
   - Functions
   - Process
   - Barriers
   - Developmental communication

2. **Kinds of communication**

   Suggested practicals/exercises

   - Verbal
   - Non verbal
     - Eye contact
     - Facial expressions
     - Body language
     - Touch
     - Interpersonal distance

3. **Communication pattern**

Suggested practicals/exercises

- Extrapersonal
- Interpersonal
- Intrapersonal
- Formal vs informal
- Mass Communication
- Direction
    - Upward
    - Downward
    - Crosswise
- Patterns and networks

4. **Communication skills**

Suggested practicals/exercises

- Reading
    - Reports
    - Articles
    - Narratives
    - Argumentative texts
- Writing
    - Report
    - Business letters
    - Resume
    - Summary of longer texts
    - Narratives & argumentative pieces
- Speaking
    - Public speaking & presentations
    - Fluency of speech
    - Persuasion
    - Introspection
- Listening
    - Instructions
    - Comprehension of heard material
    - Listening skills
    - Response in interviews and discussions

5. **Effective communication**

Suggested practicals/exercises

- Importance & benefits
- 7 C's of effective communication
- Effective communication at workplace
- Impediments to effective communication

6. **Influences on communication: Implications**

Suggested practicals/exercises

- Language
- Culture
- Conditioning paradigms• Personality

7. **Communication and technology**

Suggested practicals/exercises

- Application of technology
- Costs and benefits
- Advancements in technology
- Communication across different media
- Recent means of Communication (Email, Facebook, Twitter, etc)

8. **Pedagogical strategies and application**

Suggested practicals/exercises

- Focussed group discussions
- Role play
- Art of persuasion
- Sales and marketing
- Negotiation and bargaining
- Conflict management

Suggested Readings

- Perkins, P.S (2008). *Art and science of communication: Tool for effective communication in workplace,* John Wiley & sons, Inc.. Hoboken, New Jersy.
- Farewell, J.P (2012). *Persuasion and power: The art of strategic communication*, Georgetown university press.
- Bialey, W (2010). *Conducting the art of communication*, OUP USA, Spi edition.

- Kumar, K.G (2010). *Mass communication in India*. Jaico publishing house.
- Aggarwal, V.B., Gupta, V.S (2001). *Handbook for journalism and mass communication*, concept publishing company.
- Mcquial, D (2010). *Mcquail's mass communication theory*. SAGE Publications Ltd; Sixth Edition.
- Kaul. A (2000). *Effective business communication*, Phi learning pvt ltd.
- Prakash, S., Aggarwal, M.K (2010). *Effective office communication noting and drafting in English and Hindi*, Pustak Mahal.

*****

SYLLABUS
Environmental Studies
Sem II | AECC | 4 Credits | 912107

Relationship between environment and public health - Sustainable development: policy and practices - Biodiversity: Hotspots, Threats, Conservation - Ecosystem: Structure, Function, Energy flow, cycles - Environmental pollution & public health - Mitigation strategies - Policy - Collection and processing of environmental data - IT in ecosystem & environment management - Social and Cultural parameters - Environmental Risk & Impact Assessment.

References:

1. Fundamental Concepts in Environmental Studies, D.D. Mishra, (S Chand & Co Ltd.), 2014.
2. Environmental Management for Sustainable Development, Chris Barrow, (Routledge Environmental Management Series), 2nd Ed., 2006.
3. Essentials of Environmental Management, Paul Hyde and Paul Reeve, (IOSH Services Ltd. UK.), 2004.
4. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, Valli Manicka, (CRC Press), 2011.
5. Fundamentals of Ecological Modelling, S.E. Jorgensen and G. Bendorrichio (Elsevier), 3rd Ed., 2001.
6. Introduction to Environmental Economics, Nick Hanley, Jason F. Shogren and Ben White, (Oxford University Press), 2001.

*****

SYLLABUS

Introduction to Documentary: Technologies & Techniques

Sem III | SEC I | 4 Credits | 912302

Course Description:

This paper will introduce the sphere of Documentary as an art and will problematise the "reality" "actuality" paradigm in documentary filmmaking. It will debate the evolving definition and scope of Documentary and how the form has changed over the years. Complete in itself this paper may act as a precursor to the advanced paper on the subject.At the end of the paper the students will learn about various technologies used to produce a documentary and various genres of documentary.

1. Documentary

a. Introducing the form
b. Representation, problematising- truth, reality, objectivity, evidence paradigm
c. Evolving definitions

2. Technologies

a. Photos
b. Film
c. Video

3. Styles

a. Kino-pravada, Direct Cinema, Cinema Verite, Self-reflexive, Docudrama, mockumentary
b. Brief history

Nanook of the North (1922) by Robert J. Flaherty
Man with the Movie Camera (1929) by Dziga Vertov
Triumph of the Will (1936) by Leni Riefenstahl
Night and Fog (1956) by Alain Resnais
Chronicle of a Summer (1961) by Jean Rouch and Edgar Morin

4. Contemporary Documentary Filmmakers and their work

a. Michael Moore
b. Anand Patwardhan
c. Mike Pandey
d. James Marsh
e. Nishta Jain
f. Samina Mishra
g. Amar Kanwar

Suggested Readings and Films

1. Introduction to Documentary by Bill Nichols, Indiana University Press
2. A Fly in the Curry by Anjali Monteiro and K.P.Jayasankar, Sage Publication
3. Directing The Documentary by Michael Rabiger by Focal Press

Films

1. *Nanook of the North* (1922) by Robert J. Flaherty
2. *Man with the Movie Camera* (1929) by Dziga Vertov
3. *Triumph of the Will* (1936) by Leni Riefenstahl
4. *Night and Fog* (1956) by Alain Resnais
5. The Times of Harvey Milk (1984) by Robert Epstein
6. *The Thin Blue Line* (1988) by Errol Morris
7. Tale of Night Fairies (2002) by Shohini Ghosh
5. *Talking Heads (Muslim Women)* by Fathima Nizaruddin
6. Documentaries by Michael Moore
7. Documentaries by Anand Patwardhan

*****

SYLLABUS
Appreciating Literary Works
Sem III | SEC II | 4 Credits | 912303

Learning Objectives: upon completion of this course, a student is expected to have –

- Proficiency of skills for critical appreciation of prose, poetry, essays and dramas.
- Greater understanding of the historical and cultural context of literary works.
- Skills of responding to literature through both writing and speaking.
- The skill of appreciating literary works within a universal framework of human feeling and experience.

Unit I: Introduction to Literary Appreciation

- Literature & literary appreciation – concept, need and scope
- Different kinds of literary genres
- Approaches to appreciating Literature

Unit II: Understanding Prose

- Elements of prose (fiction and non-fiction)
- Prose analysis

Unit III: Understanding Poetry

- Language in poetry
- Elements of poetry
- Analysis of poetry

Unit IV: Understanding Essays

- Types of essays
- Analysing essays

Unit V: Understanding Dramas

- Language in drama
- Elements of drama
- Types of drama

References:

Abcarian, Richard and Klotz, Mark. (2000). Literature: *Reading and writing the human experience* (Shorter 7th ed.). USA: Bedford/St. Martin.

De Guzman Rosales, R. (2012). *Literary criticism reconsidered.* Malabon: Jimczyvulle Publications.

Tomeldan, Yolanda V. (1986). *Prism: An introduction to literature.* Manila: National Bookstore

Stanton ,Robert.1965. *An Introduction to Fiction*. New York. Holt, Rinehart and Winston,Inc.

Little, Graham. 1970. *Approach to Literature*. Sydney, Science Press.

*****

SYLLABUS

Computer Applications in Humanities & Social Science Research

Sem III | SEC III | 4 Credits | 912304

Objectives: The primary objective of this course is to learn basic data analysis with software package like SPSS. Students will learn to handle survey data, data entry, defining variables, manipulation and transformation of data. Students will be imparted the skill of data analysis and interpretation.

Unit I: Introduction

- Use of computers in Humanities and Social Sciences
- Software packages for data analysis (SPSS, Minitab, STATA, Matlab)

Unit II: Data analysis with SPSS

- General aspects, and critical issues of data analysis in SPSS
- Functions, menus and commands
- SPSS file management
- Defining variables
- Manual input of data
- Automated input of data and file import

Unit III: Descriptive Analysis

- Frequencies
- Measures of central tendency
- Data Visualisation (Tables and Charts)

Unit IV: Inferential Statistics

- T-test
- One-way ANOVA
- Non-parametric tests
- Correlation and Regression
- Multivariate Analysis (Factor and Cluster Analysis)

Unit V: Project

References:

1. Jeremy J. Foster (). Data Analysis Using SPSS for Windows – Version 6: A Beginner's Guide . Sage Publications.
2. Robert H. Carver (2013). Doing Data Analysis with SPSS Version 18.0.

*****

SYLLABUS
An Introduction to GIS & GPS
Sem III | SEC IV | 4 Credits | 912403

Course Description: Geographic Information System (GIS) deals with the analysis and management of geographic data.

This course is divided into two components: Lectures and Labs. In the lectures the conceptual elements of GIS will be discussed. Through the lab component the students will get the first-hand experience of data input, data manipulation, data storage, data visualization and spatial analytic and modeling techniques.

Goals: This course is specially designed for the students of humanities and social sciences. The basic objectives of this course for students are:

- To understand the basics of GIS concepts and theories
- To gain a hands-on experience with a variety of GIS applications, especially in humanities and social sciences
- Describe how GIS practitioners use GIS as a tool for analysis and the display of quantitative data to solve problems.
- To get acquainted with

Course requirements: No prior knowledge of GIS is required to take this course. However, since the course requires dealing with the advanced computer technology, there are a few basic prerequisites:

- Competence with the Windows / iOS operating systems, including the storing, copying and management of multiple data types and managing multiple windows and applications.
- Familiarity with data entry, sorting, editing and filtering using MS Excel.
- A strong motivation to learn, explore and have fun with computer applications is essential.

Software/Equipment: ArcGIS 10.4 and Extensions; GPS device

Syllabus

Unit I: Introduction to GIS

Definition and scope of GIS; Components and elements of GIS; Development of GIS technology; Recent trends and applications of GIS

Unit II: GIS Data Structures

Geographical data; Spatial and attribute data; vector and raster data; data input devices; storage and manipulation of GIS databases; Database Management System (DBMS)

Unit III: Spatial Data Analysis

Digitization of maps and imageries; Spatial overlay operations; network and proximity analysis; 3D models; Digital Elevation Models (DEM)

Unit IV: Global Positioning System (GPS)

Introduction to GPS; Fundamentals of GPS; GPS aided Geo-augmented Navigation (GAGAN); GPS measurements and data processing.

Required Textbook:

Heywood, Ian; Cornelius, Sarah; Carver, Steve. 2011. An introduction to Geographical Information Systems (4th Edition). Pearson Education Limited.

Rao, G. S. 2010. Global Navigation Satellite Systems, McGraw-Hill Publications, New Delhi.

Supplemental Readings:

Concepts and techniques of Geographic Information System. 2nd Edition. Prentice Hall series in GIS (2007). By C.P. Lo and Yeung Albert K.W.

GIS Tutorial: Getting to know ArcGIS Desktop. 2nd Edition. Esri Press 2010.

B. Hoffman-Wellenhof, H. Lietenegger and J. Collins. 2001. GPS – Theory and Practice. Springer-Wien, New York.

*****

SYLLABUS
Documentary Film Making
Sem IV | SEC I | 4 Credits | 912402

Course Description:
Students will explore the practice of documentary filmmaking by developing their own ideas for a documentary production. While working on their ideas they will be learning about the screen-craft and various stages of production in documentary filmmaking.

1. Conceiving and developing an idea
2. Research
3. Developing a crew
4. Screen-craft
5. Language and nomenclature of shots
6. Visual Grammar- jump cut, cut-in, cut-away, 180 degree rule, continuity
7. Shooting Script- Screenplay elements and forms
8. Storytelling and structuring
9. Shooting and editing

Suggested Readings and Films

1. Introduction to Documentary by Bill Nichols, Indiana University Press
2. A Fly in the Curry by Anjali Monteiro and K.P.Jayasankar, Sage Publication
3. Directing The Documentary by Michael Rabiger by Focal Press

Films

1. *Nanook of the North* (1922) by Robert J. Flaherty
2. *Man with the Movie Camera* (1929) by Dziga Vertov
3. *Triumph of the Will* (1936) by Leni Riefenstahl
4. *Night and Fog* (1956) by Alain Resnais
5. The Times of Harvey Milk (1984) by Robert Epstein
6. *The Thin Blue Line* (1988) by Errol Morris
5. *Talking Heads (Muslim Women)* by Fathima Nizamuddin
6. Documentaries by Michael Moore
7. Documentaries by Anand Patwardhan

*****

SYLLABUS
Legal Literacy
Sem IV | SEC II | 4 Credits | 912603

COURSE OBJECTIVE

The proposed course aims to acquaint students with the structure and manner of functioning of the legal system in India.

LEARNING OUTCOME

After this course it is expected that the student should;

- *become aware of the institutions that comprise the legal system – the courts, police, jails and the system of criminal justice administration.*
- *have a brief knowledge of the Constitution and laws of India, an understanding of the formal and Alternate Dispute Redressal (ADR) mechanisms that exist in India, public interest litigation.*
- *have some working knowledge of how to affirm one's rights and be aware of one's duties within the legal framework; and the opportunities and challenges posed by the legal system for different sections of people.*

Unit I: Outline of the Legal system in India

- Basics of Legal system
- System of courts/tribunals and their jurisdiction in India – criminal and civil courts, writ jurisdiction, specialized courts such as juvenile courts, Manila courts and tribunals, High Courts and Supreme Court
- Alternate Disputes Mechanisms such as *lok adalats*
- Non-formal mechanisms.

Unit II: Brief understanding of the laws applicable in India

- Constitution – fundamental rights and fundamental duties
- Constitutional rights and their manner of enforcement, with emphasis on public interest litigation and the expansion of certain rights under Article 21 of the Constitution.
- Environment Laws
- Consumer Rights

- Cyber Law
- Intellectual Property Rights

Unit III: Laws relating to criminal jurisdiction

- Provision relating to filing an FIR, arrest, bail, search and seizure and some understanding of the questions of evidence and procedure in Cr. P.C. and related laws
- Important offences under the Indian Penal Code
- Juvenile Justice Act
- Prevention of atrocities on Scheduled Castes and Scheduled Tribes; National Commission on SC/ST
- Laws related to women (Dowry, Violence, Property, sexual abuse etc.)
- Principles of Natural Justice
- Fair comment under Contempt laws
- Personal laws in India: Pluralism and Democracy.

Suggested project/practical: *Preparation of a Case History of a litigant or a person being counseled either in a court or a legal aid centre set up by the Legal Services Authority in Delhi or an NGO or a Lok Adalat, through in depth interview of the subject.*

Unit IV: Functioning of the legal system

- Access to courts and enforcement of rights
- Critical Understanding of the Functioning of the Legal System
- Legal Services Authorities Act and right to legal aid
- ADR systems
- What to do if you are arrested; if you are a consumer with a grievance; if you are a victim of sexual harassment; domestic violence, child abuse, caste, ethnic and religious discrimination
- Filing a public interest litigation
- How can you challenge administrative orders that violate rights, judicial and administrative remedies

Unit V: Human Rights

- Eemerging trends
- Role of legal aid agencies, Human Rights Commissions, NGOs and civil liberties groups.

Suggested project/practical: *Preparation of an FIR or writing a complaint addressed to the appropriate authority using a hypothetical case of (for example) child abuse or sexual harassment or any other violation of a right.*

Suggested Readings

Asha Bajpai, Child Rights in India: Law, Policy and Practice, New Delhi, OUP, 2003.

B.L. Wadhera, Public Interst Litigation - A Handbook, Delhi Universal, 2003.

Flavia Agens, Law and Gender Equality, Delhi, OUP, 1997.

Indian Social Insitute, Legal Literacy Series booklets, Available in Hindi also

Jaya Sagade, *Law of Maintenance: An Empirical Study*, Pune, ILS Law College, 1996

Kamala Sankaran and Ujjwal Kumar Singh, Towards Legal Literacy, Delhi, OUP, 2008

Multiple Action Research Group, Our Laws, Vols 1-10. Available in Hindi also.

Nomiat Agarwal, Women and Law in India, Delhi, New Century, 2002.

P.C. Rao and William Sheffiled, Alternate Dispute Redressal: What it is and How it Works, Delhi, Universal Law Books, 2002.

Parmanand Singh, 'Access to Justice and the Indian Supreme Court; 10&11 Delhi Law Review, p. 156, 1981-82

S.K. Agarwal, Public Interest Litigation in India, KM Munshi memorial Lecture, Delhi,Indian Law Institute, 1985.

S.P. Sathe, Towards Gender Justice, Bombay, SNDT Women's University, 1993.

V.N. Shukla's Constitution of India by Mahendra P. Singh, Lucknow, eastern Book Co, 2001

*****

SYLLABUS

Film Appreciation

Sem IV | SEC III | 4 Credits | 912404

Unit 1: Form

Elements of a film
Language and grammar of visuals
Diegetic and non-diegetic sounds

Unit 2: Cinema as a Narrative

Linear vs non-linear storytelling
Film Genres

Unit 3: Indian Cinema- noted directors and styles

Bollywood
Hindi Parallel Cinema
Regional Cinema movements

Unit 4: International Cinema

Soviet Cinema
German Expressionism
Italian Neorealism
French New Wave
British Cinema
Japanese Cinema
Iranian Cinema
Korean Cinema

Suggested Readings

1. Deep Focus: Reflections on Cinema by Satyajit Ray
2. The Sage Handbook of Film Studies by edited by James Donald and Michael Renov, 2008
3. Film As Film: Understanding And Judging Movies by Vitor F. Perkins, Penguin 1972
4. Art of Watching Films by Joseph M. Boggs, Dennis W. Petrie, 2005

*****

Translation
Sem IV | SEC IV | 4 Credits | 912405

Syllabus NOT AVAILABLE

SYLLABUS
Introduction to Digital Humanities
Sem VI | Core | 6 Credits | 912601

Course Description

This course is designed to introduce students with the new and emerging field of academic inquiry – digital humanities – which merges together the information technology and humanities. In digital humanities the modern digital technologies are utilised as tools and techniques to understand humanities disciplines. Computational methodologies are used to further humanities research and teaching.

The interdisciplinary nature of digital humanities comes alive through projects which are, therefore, its indispensable aspects. These projects reflect an intersection of academic disciplines and attempt to answer humanities based questions by integrating a variety of multimedia formats in a dynamic environment. This course, hence, is a hands-on introduction to the burgeoning field of digital humanities and attempts to answer the questions like: What is "digital humanities"? What are its methodologies and how are its tools created and utilized? How digital methodologies are used in literary humanities and cultural studies? How can humanities scholars use computational and digital methods to address a research challenge?

Objectives

1. Provide students with an overview of digital humanities, including its history and applications.
2. Introduce students to the theory and practice of digital humanities through critical learning and use of various standards, applications, and tools.
3. Imparting technical skills and competencies for understanding and creating basic humanities resources.
4. Prepare students to undertake more advanced courses in the field of digital and exact humanities.

Syllabus

Unit I – Introduction to Digital Humanities

Defining digital humanities

Nature, Concept and Scope

Need and importance

Disciplines and the constituents

Unit II – Theories and Debates in Digital Humanities

History of technology and the arts & humanities

Theories and debates in digital humanities

Challenges and the future of DH

Unit III – Digital Data and Information

Collections and Digital Editions

Big Data and Metadata

Digital Libraries and Archives

Cyber-infrastructure

Digital Footprint

Techniques for extracting and analyzing digital data

Unit IV – Tools and Methodologies

Digital Exhibits

Digital Mapping

Text Analysis and Information Visualization & Conceptualization

Network Analysis

Geospatial digital humanities (Geographical Information System)

3D-Modelling, Animation and publishing tools

Unit V – Project

An innovative project which uses the techniques of digital humanities will be undertaken by groups of students independently or in collaboration with other departments / disciplines / industry / organizations.

Sample projects:

- Creating a descriptive web-based database catalogue of Mahatma Gandhi.
- Making an atlas of Tribal languages of North India.
- Digitize classical books and volumes and place them on the web.
- Digitizing oral narratives to make endangered oral literatures accessible.
- 3D Modelling of historical monuments

Suggested Readings

Anne Burdick et al. 2012. *A Short Guide to the Digital Humanities.*

Burdick, Annie et.al., 2012. *Digital Humanities,* Cambridge: The MIT Press.

Franco Moretti. 2005. *Graphs, Maps, Trees.*

Matthew K Gold. Ed. 2012. *Debates in the Digital Humanities.*

Susan Schreibman, Ray Siemens, John Unsworth. 2004. *A Companion to Digital Humanities.* Oxford: Blackwell.

*****

SYLLABUS
Innovation Management
Sem VI | Core | 6 Credits | 912602

Course Introduction

This paper aims to provide a general introduction to the nature of innovation in the economy, and covers a wide range of associated topics, which must be addressed by management and policy makers. It comprises a set of self-contained, but related topics, which are necessary to understand the nature of innovation and entrepreneurial decisions. A variety of perspectives is examined.

Topics and Applications

Understanding Innovation, organizational and individual innovation, Models of innovation, Creativity and innovation process, product innovation and profitability, flexibility and innovation, Innovation and invention, intuitive tools for innovative thinking, innovation assessment, scientific and social innovation, innovation in different domains, creativity and innovation, organizational innovation and knowledge management, technology innovation and life cycle, management of technology innovation, innovation management in business organization, innovation and community development, innovation around the world (examples of different countries, policies, practices and issues), future innovation and management issues.

Case studies of innovation: causes, impacts and strategies (technologies, sectors and products)

Note: The syllabus of this paper is same as approved syllabus of B.Tech. (Information Technology & Mathematical Innovation). Additional reading list has been provided as per the requirement of B.A. Honours (Humanities & Social Sciences).

Suggesting Readings

Afuah, Allan. 2003. *Innovation Management: Strategies, implementation and Profits.* OUP, New York.

Berman, Bruce and Kevin Rivette. 2006. *Making innovation Pay.* John Wiley & Sons, New Jersey.

Goldsmith, Stephen, Gigi Georges and Tim Glynn Burke. 2010. *The Power of Social Innovation: How Civic Entrepreneurs Ignite Community Networks for Good.* Jossey-Bass, San Francisco.

Kelly, Tom and Jonathan Littman. 2011. *The Art of Innovation.* Profile Books Ltd., London.

Radjou, Navi, Jaideep Prabhu and Simone Ahuja. 2013. *Jugaad Innovation: A Frugal and Flexible Approach to Innovation for the 21st Century.* Random House India.

Saul, Jason. 2011. *Social Innovation, Inc.* Jossey-Bass, San Francisco

*****

SYLLABUS

Theoretical Debates in Humanities & Social Sciences

Sem VI | Core | 6 Credits | 912605

Course Description

This paper will introduce students to major theoretical debates and contextualise them in their historical timeline and society. It will emphasise on the relevance of plurality of theoretical debates in Humanities and Social Sciences and its usefulness in finding solutions to the existing subject of social enquiries and problems.

Syllabus

1 Key historical events- American Revolution, French Revolution, Imperialism, Russian Revolution, Cold War and Globalisation

2. Humanism- Jean-Jacques Rousseau, Carl Roger and M N Roy

3. Nationalism

4. Marxism

5. Gandhism

6. Representation and Subaltern discourses- Edward Said and Gayatri Spivak

6. Gender discourses

7. Semiotics— Ferdinand de Saussure and Roland Barthes

9. Ideology and Hegemony- Antonio Gramsci

10. Aesthetic Theories

Suggested Readings

1. Aesthetic Theory by Theodor W. Adorno by Bloomsbury Academics, 1997
2. Antonio Gramsci: Selections from the Prison Notebooks
3. M.N.Roy: Radical Humanist: Selected Writings by M.N.Roy
4. Imagined Communities: Reflections on The Origin and Spread of Nationalism by Benedict Anderson published by Verso
5. Nationalism by Rabindranath Tagore published by Prabhat Books in 2008
6. Beyond Belief: India and the Politics of Postcolonial Nationalism (Politics, History and Culture) by Srirupa Roy published by Duke University Press in 2007
7. The Second Sex by Simone de Beavoir
8. Gender Trouble by Judith Butler published by Routledge Classics published in 2016
9. A Room of One's Own by Virginia Woolf
10. Hind Swaraj by Mahatma Gandhi
11. My Experiments with Truth by Mahatma Gandhi
12. The Origin of Family, Private Property and the State by Friedrich Engels
13. Communist Manifesto by Karl Marx
14. Karl Marx: A Reader edited by Jon Elster
15. Orientalism by Edward Said
16. Nationalism and the Imagination by Gayatri Spivak

17. Who Sings the Nation-State? Language, Politics, Belonging by Judith Butler and Gayatri Spivak
18. Culture and Imperialism by Edward Said
19. Reflections on Exile by Edward Said
20. Course in General Linguistics by Ferdinand De Saussure
21. Mythologies by Roland Barthes
22. Elements of Semiology by Roland Barthes

*****

SYLLABUS
Art & Design
Sem VI | SSP | 6 Credits | 912604

Introduction

Art, Craft and Design are three inter-dependent disciplines. They are fundamental to human existence, predating written language. They play a major role in human evolution and development. Each involves a different way of thinking:

• Art springs from ideas, feelings, and visual qualities

• Craft involves the right use of tools and materials

• Design emphasises on planning, problem-solving, aesthetics and presentation.

The above three elements unite in the basic human drive to carve and shape the world for functional purposes and to express and communicate ideas. The contribution of the visual and plastic arts enriches the living of the otherwise mundane life.

Art, Craft and Design provide unique and holistic education, through the use of heart, head and hand, enabling a person to shape his or her world with discernment, as also, to understand and respect the work of others. The benefit of education in Art, Craft and Design for the student at a developmental stage extends far beyond the idea of mere a competence in the subject itself. Art, Craft and Design education help develop personal qualities, particularly those of initiative, perseverance, sensibility and self-reliance.

To this end, the understanding of art, design and aesthetics not only helps the student to understand and widen their knowledge about art and design and use it for vocational purposes but also enhances their personality formation.

Objective

- This is more practical and industry genial to cater to the needs of society and nation.
- The course is a stream specific paper of Art and Design stream for the students of B.A. Honours (Humanities and Social Sciences) at Cluster Innovation Centre that helps the student fill in the gaps of his knowledge about the subject.

Unit 1 Understanding Art (Compulsory)

- Basics of Art and Design
- Understanding Aesthetics

- Concept of Idea & Idea generation
- Definition of key terms and concepts
- Design elements and principles
- Colour-concept, schemes and usage
- Layout- Print and Electronic media
- Visualisation- Concept and Process
- Art appreciation

Unit 2 Indian and Western Art (Compulsory)

- Introduction of schools of Indian Art and Painting: Classical and Modern
- Introduction to various Western movements in Art: Classical and Modern
- Comparative Study of Indian & Western Modern Art

Unit 3 Folk Art - Choose any two out of the following (at least one week workshop/ practical training on each one would be organised)

- Painting
- Printing
- Weaving
- Sculpturing
- Clay modelling
- Art metal work
- Calligraphy
- Pottery-ceramics
- Puppetry

Unit 4 Modern Applied Art- Choose any two out of the following (atleast one week workshop/practical training on each one would be organised)

- Cartooning
- Photography
- Design Softwares
- Display Design

- Design and packaging
- Set designing
- Event design
- Campaign planning

Unit 5 Practical Training/Workshop/Product Design/Field visits

- Production Portfolio
- Visits to exhibitions/Fairs/Fests/Malls/other fields related to the subject
- Organisation of an exhibition/product design to give hands-on experience

Note:

- *The syllabus is divided into two parts one is Compulsory and other is Optional.*
- *Every student is required to submit a production portfolio at the end of the semester.*

Suggested Readings:

Barret, D. and Gray, B. 1963. *Painting of India*. The World Publishing Co., Ohio.

Brown, Percy. 1981. *Indian Paintings under the Mughals*. Cosmo Publications, New Delhi.

G K Parthasarathy. 2006. *Computer Aided Communication*. Authors Press.

Kramrisch, Stella. 1983. *Survey of Painting in the Deccan*. Oriental Books, New Delhi.

Ray, Niharanjan. 1974. *An Approach to Indian Art*, Publication Bureau, Panjab University, Chandigarh.

Read, Herbert. 1972. *Meaning of Art*. Faber and Faber, London.

Saraswati, S.K. 1975. *A Survey of Indian Sculpture*. Munshiram Manoharlal Publishers, New Delhi.

Sarkar, N.N. 1998. *Designing Print Communication*. Sagar Publishers, New Delhi.

Sarkar, N.N. 2001. *Art and Production*. Sagar Publishers, New Delhi.

*****

SYLLABUS
Counseling
Sem VI | SSP | 6 Credits | 912604

Preamble of the Course:

With the rapid influx of cultural transmissions, there seems to be a tremendous scope for counsellors and mental health practitioners to address the unfamiliar and familiar psychosocial concerns of the society. With this as the backdrop, the present course aims in sensitizing students towards a deeper understanding of human facets, examine their genesis along with visioning a possibility for its healing.

Through this paper, students shall learn to appreciate their cultural nuances in the making of individual psyche with the help of varied creative mediums (like theatre, music, films, literary texts).

The students shall also be facilitated to sharpen their competencies in some of the requisite skills for counselling setting.

Objective of the Course:

To develop an insight into counselling as a process and one's own position as a counsellor. To have a critical understanding of the theoretical paradigms based on which counselling as a process needs to be initiated.

To gain clarity in the purpose, scope and techniques of counselling as a process, and how it needs to be culturally tailored so as to meet the context specific demands.

Outline of the Course:

In brief, the course shall contain a blend of theory and practicum where much of the learning for the student will be guided through their hands on experiences. Classes shall also conducted through workshop mode, insight learning, and text analyses (of different mediums)

Unit I - Understanding Counselling as a Process

- What is counselling? Who are counsellors and helpers? Definition and meaning of counselling and its uniqueness from therapy. Who needs counselling and When should be it given?
- Scope of counselling: different emerging contexts in which counselling can be extended- Developmental, trauma and chronic illness, HIV/AIDS, survivors of natural calamities, human disasters, relationship counselling, education counselling, gender and third gender counselling(there will be brief introduction to these areas, with detailed study on any three).
- What does an individual brings to counselling as a counsellor? Potential requisites for being a counsellor- active listening, ability to encourage the client in opening up, probing skills, appreciation for the client, ability to empathise, issues of transference and counter transference.

- What should not happen in the counselling setting? Ethical issues of practice and concern in counselling.
- Culture and counselling.

Unit II - Understanding Human Psyche: Appreciating the role of emotions in human behaviour

- Interface of human behaviour, emotion and psyche
- Personality development
- Insight into Emotions
- Structure and dynamics of Human Psyche (Freudian, Jungian, Humanistic and Existentialists, Eastern philosophy)
- Cultural roots to behaviour.
- Issues and concerns of normalcy. Critically examination of deviancy and it plays a role in human behaviour.

Unit III – (a) Theoretical schools of thought of counselling (any two)

- Client-Centred approach
- Psychodynamic approach
- Phenomenological approach
- Psychoanalytic approach
- Cognitive therapy
- Group therapy
- Transactional analysis

(b) Understanding of Normalcy-

- Issues and debates on what is being normal.
- Exploring the nomenclature of deviancy from a socio cultural and clinical perspective.
- Psychiatric disorders; their classification(based on bio clinical model) genesis, signs and symptoms,

- Challenges of the clinical disorder and the choice of approaches for counselling; examining the why and how of it.

Project Based Units

Based on the interest and expertise of the facilitator, students have to opt for any two units from the following units for detailed study. They would also be required to develop their projects, conduct their internship in any of the two units in float. This shall be considered for both practical and theoretical evaluation. Students would be required to prepare a project based on their field experiences and later do a presentation of it in the classroom. The project report would also be considered for evaluation.

Unit IV - Counselling of Trauma and Chronic Illnessess

Unit V - Counselling of Gender and Violence

Unit VI - Counselling with survivors of human disaster and natural calamities

Unit VII - Counselling in Relationships (marital issues, family conflicts, parent child relationships)

Unit VIII - Educational counselling

Unit IX - Report writing based on field training/ internship. Highlight the challenges of one's exposure of the field and how to make sense of the learning.

Note: Unit I, II, III and IX shall be compulsory for all students. 1-2 units will be done in addition as per the requirement of the course/students.

Suggested Readings

Dalal, Ajit K. and Girishwar Misra. 2012. *New Directions in Health Psychology.* Sage.

Dalal, Ajit K. 2012. *Psychology of Health and Well Being*. Sage.

Dalal, Ajit K. 2015. *Health Beliefs and coping with Chronic Diseases*. Sage.

Feltham, Colin and Windy Dryden. 2006. *Brief Counselling: A practical integrative approach.* 2nd Edition. Open University Press, England.

Hough, Margaret. 2014. *Counselling skills and theory.* 4th Edition. Hodder Education, London.

Nelson-Jones, Richard. 2012. *Basic counselling skills: A Helper's Manual.* 3rd Edition. Sage.

Rogers, Carl R. 2003. *Client Centred Therapy: Its Current Practice, Implications and Theory.* Constable & Robinson Ltd., London. (First published 1951)

Sue, Derald Wing and David Sue. 2012. *Counselling the culturally diverse: Theory and Practice*. 6th Edition. Wiley.

*****

SYLLABUS

Historical Tourism in India

Sem VI | SSP | 6 Credits | 912604

COURSE OBJECTIVES:

- *To acquaint students with the significance of Historical tourism in India.*
- *To create awareness about heritage of our past.*
- *To encourage students find innovative ways for the promotion of tourism with special reference to Historical Tourism.*
- *To enable the students for sustainable contribution to the tourism industry in India.*

LEARNING OUTCOMES:

- *Appreciation of the relevance and role of history in tourism, particularly in India.*
- *Awareness of rich cultural and heritage wealth of India.*
- *Learning for the preservation of culture and performing arts through tourism.*
- *Familiarising students with the establishment of enterprise and enable them to become successful Tourism entrepreneurs.*
- *Facilitate students to design new tourism products to tap our unused tourism capacity.*

---

1. Introduction

- Tourism: Definition, Meaning and Concept
- Tourism as an Industry – World Scenario
- Tourism Types with special emphasis on Historical Tourism
- History & Development of Tourism in India – Trends & Profiling of Tourists
- Importance of Heritage Tourism in India

Suggested projects/practical: *students will be given an assignment to collect data regarding the purpose of visit by foreign tourists)*.

2. Tourism Products of India – Heritage, Culture and Performing Arts

- Tourism Product Diversity – Nature, Culture & Art
- World Heritage Sites
- Pilgrimage
- Art and Architecture

- Tribal Art and Culture
- Performing Arts – Dance, Music and Theatre

Suggested projects/practical: *Make a detailed study of at least one historical site / any other heritage tourism product like dance, music, culture, festivals etc. in order to promote historical tourism products.*

3. Management, Marketing and Entrepreneurship in Historical Tourism

- Tourism Organizations – International, National & Regional
- Indian Tourism Policies – 1982, 1992 & 2015 (Draft Tourist Policy)
- Management Issues in Historical Tourism
- Tour Operators & Travel Agencies
- Hotels & Other Accommodation
- Public Relations
- Guiding and Escorting
- Tourism Marketing (Process, Promotion, Publicity etc.)

Suggested projects/practical: *Guide a group of foreign tourists visiting Delhi* OR *study a tour operator / travel agency / the working of a tourism organisation.*

4. Historical Tourism Product Designing

- Concept of Tourism Product
- Life Cycle of a Tourism Product
- Carrying Capacity
- Need for New and Innovative Tourism Products
- Problems of Tourism Product Designing
- Technology and Tourism (with emphasis on Historical Tourism)

Suggested projects/practical: *Designing a historical tourism product keeping in view the available products and carrying capacity.*

5. **Fieldwork/Projects**

- Heritage walks (with emphasis on planning a heritage a walk to historical sites in Delhi). Visit to some important monuments in Delhi.
- A short project to be submitted (on any heritage/historical site in India; e.g. A case study of DU and adjoining areas in the context of Historical Tourism).
- Writing for Historical Tourism – writing newspaper articles, scripts and travelogues. Designing pamphlets, hoardings and brochures.
- Make a repository of data through data collection using questionnaire and survey method.

Suggested Readings:

(English)

Agrawala, Vasudev Sharan. 1964. *The Heritage of Indian Art*. Publication Division, Ministry of Information & Broadcasting,

Banerjee, Utpal K. 2006. *Indian Performing Arts: A Mosiac.* Harman Publishing House, New Delhi

Basham, A.L. 1971. *The Wonder That was India*. Sidgwick & Jackson.

Chopra, Suhita. 1991. *Tourism Development in India,* Ashish Publishing House, New Delhi.

Erdman, Joan L. (ed.) 1992. *Arts Patronage in India: Methods, Motives and Markets,* New Delhi.

Harle, J.C. 1986. *The Art and Architecture of the Indian Sub-continent,* Penguin, (Reprint, London, 1990).

Howell, David W. 1989. *Passport: An Introduction to the Travel and Tourism,* Ohio.

IGNOU Material for Tourism Studies (TS-1, TS-3, TS-6)

Kotler, Philip. 2002. *Marketing for Hospitality & Tourism.* PHI, New Delhi.

Ministry of Tourism, Govt. of India. *India Tourism Statistics. 2014*

Rogers, H.A. and J.A. Slinn. 1993. *Tourism: Management of Facilities.* London.

(Hindi)

Agrawala, Vasudev Sharan. 1965. *Bhartiya Kala*, Khand-1, Rajkamal Prakashan, Delhi.

Basham, A.L. 1993. *Adhbhut Bharat*, (tr. by Venkateshchandra Pandey), Shiva Lal Agarwala & Co., Agra.

Goyal, Ashish. 2010. *Aitahasik Paryatan*. ALP Books, Delhi.

Goyal, Ashish. 2010. *Bharat Mein Paryatan Vikas*. ALP Books, Delhi.

Sagar, Arun. 2007. *Bharat ke paryatan Sthal*. Raja Pocket Books, Delhi.

Sahay, Shivaswaroop. 2006. *Paryatan-Siddhaant Aur Prabandhan Tatha Bharat Mein Paryatan.* Motilal Banarsidass Publishers Pvt. Ltd., Delhi.

Singh, Surjit. 2012. *Bhartiya Sanskriti Avam Aitahasik Paryatan.* (Indian Culture and Heritage Tourism) Rawat Publication, Delhi.

Vyas, Rajesh Kumar. 2008. *Paryatan, Udhbhav evam Vikas*. Rajasthyan Hindi Granth Academy, Jaipur.

Yadav, M. 2012. *Paryatan Evam Vikas*, Aavishkar Publishers & Distributors, New Delhi.

*****

SYLLABUS
Journalism
Sem VI | SSP | 6 Credits | 912604

INTRODUCTION

Journalism relates to information, education, mass communication, visualization, expression. It is powerful and thus should be thrived to attain righteousness, justice, truth for the larger interest of the nation and society at large.

OBJECTIVE

- After doing the theoretical studies in previous semesters, it aims towards the practical application of the learning in previous semesters.
- It also aims towards fulfilling the gaps in the trajectory of the students at Cluster Innovation Centre in this stream

NOTE

- Student is required to do minimum 15-day internship at a media house of repute and submit a report on that in consultation with the internal and external mentor
- Workshops and Field visits to be organized as per requirements.

Unit 1

Choice of one topic from three of the following:

1. Media Laws and Ethics- Press Freedom and Laws, Acts & Laws, Media Councils and Committees, Code and Ethics
2. Development Communication- Concept of Development, Indicators of Development, Development Issues, Theories of Development, Media and Development
3. Environment Communication- Media and environment, media and ecology, media and environmental disaster, Communicating environmental social issues

Unit 2

Choice of one topic from three of the following:

1. Reporting and Editing- Introduction, Types of Reporting, Qualities and Responsibilities of reporters, Reporting Staff, Beats, Set ups and functions of reporting rooms
2. Writing for media- Essentials of good writing, Art of phrasing, translation, creativity in writing, types of writing
3. Film Appreciation

Unit 3

Choice of one topic from three of the following:-

1. Global Media Scenario- Historical perspectives of communication, struggle of balance of information flow, contemporary trends in global media world, Impact of global media scenario on India
2. Current Affairs- National and International
3. Application of Computers in Media- PageMaker, Corel Draw, Photoshop, QuarkExpress

Unit 4

Choice to be made from three of the following:-

1. Print
    a. History of Media- Pre and Post- Independence Journalism in India, News organisations, current trends, growth of media in India.
    b. Newspaper and Magazine Layout and design- Components of layout, layout planning
    c. Print Production- Production process
2. Broadcast and New Media
    a. Radio Journalism- Origin and development of Radio in India, AIR, Commercial Broadcast Services, Script writing, Community Radio
    b. T.V. Journalism- Origin and development of Television in India, Doordarshan, Commercial Channels, Script writing
    c. New Media Journalism- Online Journalism, Features, Multimedia & Convergence, Laws and ethics
3. Advertising, PR
    a. Advertising- Integrated Marketing Communication, Account Planning, Creative strategy, media planning
    b. Public Relations- Definitions, Tools and Techniques, Role of Public Relations, PR Campaign
    c. Media Management- Functions & Principles, Behavior & Leadership, Media Organisations - structures and functions

Unit 5

Practical Training/Workshops/Field Design

- Student is required to do minimum 15-day internship at a media house of repute and submit a report on that in consultation with the internal and external mentor
- Workshops and Field visits to be organized as per requirements.

Suggested Readings

Bhatt, S C. 2000. *Indian Press Since 1955*, Publication Division, Ministry of Information & Broadcasting, Government of India.

Friend,Cecilia, Jane B. Singer. 2007. *Online Journalism Ethics: Traditions and Transitions*.

Hough, George. A. 2006. *News Writing* , Kanishka, New Delhi.

Jan R. Hakemulder, Ray Ac De, P. P. Singh. 1998. *News Reporting and Editing*, Anmol Publications, New Delhi.

Jefkins, Frank. 2007. *Advertising*, Tata Mcgraw Hill, New Delhi.

Kotler, Philip. 2002. *Marketing Management*, Pearson Prentice Hall.

McLeish, Robert. 2005. *Radio Production* , Focal Press.

Natrajan, J. 1997. *History of Indian Journalism*, Publications Division-Ministry of Information & Broadcasting, Government of India, 1997

Parthasarthy, Rangaswami. 1997. *Journalism in India*, Sterling Publishers, New Delhi.

Ravindranath, P.K. 2007. *Press Laws and Ethics of Journalism*, Author Press, New Delhi .

Redmond J, Trager R. 2004. *Media Organizations and Management Biztantra*, New Delhi.

Rogers, Everett M. 2000. *Communication and Development: Critical Perspective*, Sage, New Delhi

Sarkar, N.N. 1998. *Designing Print Communication*, Sagar Publishers, New Delhi.

White, Ted. 2007. *Broadcast News*, Focal Press, New Delhi.

Zachariah, Aruna. 2007. *Print Media, Communication and Management: Elements, Dimensions and Images*, Kanishka Publishers, Delhi.

*****