Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

Course Contents (Syllabus) for

Second Year M. Tech.
(Mechanical Design Engineering)
Sem – III to IV

AY 2020-21

Title of the Course: Dissertation Phase I (3DE690) and Dissertation Phase II (3DE691 & 3DE692)	L	T	P	Cr
	0	**0**	**8+12**	**4+2+4**

Pre-Requisite Courses:

Textbooks: As per the research topic.

References: National and International Journals

Course Objectives:

1. To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders.
2. Acquire knowledge to tackle real world problems of societal concerns.
3. Impart flexibility to the student to have increased control over his/ her learning.
4. Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor.
5. Enhance student's learning through increased interaction with peers and colleagues.

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive level	Descriptor
CO1	Search the existing literature and identification of research problem	IV	Analyzing
CO2	Design and develop the solution for complex engineering problem.	V	Evaluating
CO3	Create the new knowledge in the specialized field	VI	Creating

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

Assessments:

Teacher Assessment:

In Semester Evaluation (ISE) and End Semester Evaluation (ESE)

Evaluation Scheme			
Scheme	Credits	Practical (Marks)	
		Max	Min for Passing
MSE	4	100	40
ISE 2	2	100	40
ESE	4	100	40

Course Contents:

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects in this semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Professional Elective (Theory) Courses

Title of the Course: Advanced Finite Element Method, 3DE611 Professional Elective 5	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses:

Textbooks:

1. Cook, R. D., Malkus, D. D. and Plesha, M. E., "Concepts and Applications of Finite Element Analysis", 4th edition, 2001.
2. Bathe, K. J., "Finite Element Procedures",1st edition,2008.
3. Hughes, T. J. R., "The Finite Element Method – Linear Static and Dynamic Finite Element Analysis",2012.

References:

1. Belytschko, T., Liu, W. K. and Moran, B., "Nonlinear Finite Elements for Continua and Structures".
2. Brebbia, C. A. and Dominguez J. "Boundary Elements an Introductory Course", freely available at http://www.boundaryelements.com/

Course Objectives:

1. Student will be able to develop his own FE formulation for static problems.
2. Student will be able to decide the best suited method for transient analysis.
3. Student will be able to appreciate the amount of computational efforts required to solve non-linear problem.
4. Student will understand mathematical modeling technique for beams and plate.
5. Student will be able to apply various beam and plate theories to develop FE model.

Through course project student will apply his understanding of FE in his/ her own field

- **Course Learning Outcomes:**

Fundamentals of finite element analysis including, discrete system analysis, steady state and transient heat transfer analysis, static and dynamic analysis of structures. Modeling, analysis and design using FEA software.

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Solve non-linear problems using FEM.	3	Applying
CO2	Analyze structural analysis using beam, plate and shell elements.	4	Analyzing
CO3	Evaluate the given design problem using FEM.	5	Evaluating

CO-PO Mapping:

	1	2	3	4	5	6
CO1	2		2	2		
CO2	3				3	
CO3						3

Assessments:

ISE1 and ISE2 can be based on quiz, assignments, oral, presentation, survey, surprise test, mini project etc. ISE assessment scheme will be declared by teacher at start of the course. ISE1 marks are open to students.

ISE2 marks are hidden component for students.

MSE (generally on module 1-3) and ESE (30-40% weightage for modules 1-3 and 60-70% weightage for modules 4-6) may have 0-20% optional questions.

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Linear static analysis	**5 Hrs.**
Weighted residual formulation, shape functions, numerical integrations.	
Module 2: Solution methods to solve linear transient problems	**7 Hrs.**
Explicit and implicit methods, Newmark family of methods, conditional and unconditionally stable methods and determination of correct time step.	
Module 3: Non-linear finite Element Method	**7 Hrs.**
Ways of non-linearities, mathematical treatment, Picard's method, Newton's method, advantages and limitations of each method, snap through problem.	
Module 4: Analysis of beams	**7 Hrs.**
Euler Bernoulli beam theory, Timoshenko beam theory, Formulation of beam element using both above theories, their advantages and limitations, solution strategies to overcome limitations.	
Module 5: Analysis of plates and shells	**7 Hrs.**
Basics of plate theory, thin and thick plates, FE formulation based on various plate theories, plate elements, continuity requirements.	
Module 6: Course Project – self learning	**7 Hrs.**
The student is expected to define his/ her own problem which involves substantial complications in terms of geometry, boundary conditions etc. in any field and then try to solve the same either by developing own code or using commercially available softwares. Difficulties will be discussed in class in common or individually.	

Module wise Measurable Students Learning Outcomes:

1. Student will be able to comprehend the variation methods in of FEM.
2. Student will able to use the solution techniques.
3. Student will get knowledge about analysis of non-linear systems using FEM.
4. Student will able to perform structural analysis using beam elements.
5. Student will able to perform structural analysis using plates and shell elements.
6. Student will apply the FEM technique to solve the given case study.

Title of the Course: Multi body Dynamics, 3DE612 **Professional Elective 5**	L	T	P	Cr
	3	--	--	3

Pre-Requisite Courses:

Textbooks:

1. Wittenburg, J., *Dynamics of Systems of Rigid Bodies*, B.G. Teubner, Stuttgart, 1977.
2. Kane, T.R, Levinson, D.A., *Dynamics: Theory and Applications*, McGraw-Hill Book Co., 1985.
3. Nikravesh, P.E., *Computer Aided Analysis of Mechanical Systems*, Prentice-Hall Inc., Englewood Cliffs, NJ, 1988.

References:

1 Roberson, R.E., Schwertassek, R., *Dynamics of Multibody Systems*, Springer-Verlag, Berlin, 1988.
2. Haug, E.J., *Computer-Aided Kinematics and Dynamics of Mechanical Systems-Basic Methods*, Allyn and Bacon, 1989.
3. Huston, R.L., *Multibody Dynamics*, Butterworth-Heinemann, 1990.
4. Schielen, W. *ed.*, *Multibody Systems Handbook*, Springer-Verlag, Berlin, 1990.

Course Objectives:

1. Derive equations of motion for interconnected bodies in multi-body systems with three dimensional motion.
2. Write programs to solve constrained differential equations for analyzing multi-body systems.
3. Lead team projects in academic research or the industry that require modeling and simulation of multi-body systems.

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Implement and analyze methods of formulating equations of motion for interconnected bodies	3	Analyze
CO2	Simulate and analyze all types of static and dynamic behaviors of the multi-body systems including the kineto-static analysis.	5	Apply
CO3	Demonstrate an improved technical writing and presentation skills.	4	Demonstrate

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**
CO1	2			2		
CO2	2				1	3
CO3	2				2	

Assessments:

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: **Introduction**	**7Hrs.**
The method of constraints for planar kinematic analysis. Revolute, prismatic, gear and cam pairs are considered together with other 2 degrees-of-freedom types of constraints.	
Module 2: **Basic principles for analysis of multi-body systems:**	**7Hrs.**
The automatic assembly of the systems of equations for position, velocity and acceleration analysis. Iterative solution of systems of non linear equations. Geometry of masses. The principle of virtual work and Lagrange's equations.	
Module 3: **Dynamics of Planar Systems:**	**7Hrs.**
Dynamics of planar systems. Systematic computation and assembly of mass matrix. Computation of planar generalized forces for external forces and for actuator-spring-damper element. Simple applications of inverse and forward dynamic analysis. Numerical integration of first-order initial value problems. The method of Baumgarte for the solution of mixed differential-algebraic equations of motion. The use of coordinates partitioning, QR and SVD decomposition for the orthogonalization of constraints.	
Module 4: **Kinematics of rigid bodies in space:**	**7Hrs.**
Reference frames for the location of a body in space. Euler angles and Euler parameters. The formula of Rodrigues. Screw motion in space. Velocity, acceleration and angular velocity. Relationship between the angular velocity vector and the time derivatives of Euler parameters.	
Module 5: Kinematic analysis of spatial systems:	**6Hrs.**
Basic kinematic constraints. Joint definition frames. The constraints required for the description in space of common kinematic pairs (revolute, prismatic, cylindrical, spherical). Equations of motion of constrained spatial systems.	
Module 6: Computation of Forces:	**6Hrs.**
Computation of spatial generalized forces for external forces and for actuator-spring-damper element. Computation of reaction forces from Lagrange's multi- pliers.	

Module wise Measurable Students Learning Outcomes:

After the completion of the course the student should be able to:

1. Identify system properties such as DOF, constraints etc
2. Derive and solve non linear equations
3. Apply various techniques for solving differential equations of motion
4. Define various parameters of body in space
5. Analyze kinematics of mechanisms
6. Compute forces acting in a mechanism and its use

Title of the Course: Experimental Stress Analysis, 3DE613 **Professional Elective 5**	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Strength of Material

Textbooks:

1. Dally J. W., Riley W. F. , *"Experimental Stress Analysis",* McGraw Hill, Third Edition1991
2. Dr. Sadhu Singh, "*Experimental Stress Analysis"*, Khanna Publishers, Fourth Edition, 2015.

References:

1. Srinath, L.S., Raghava, M.R., Lingaiah, K., Garagesha, G., Pant B., Ramachandra, K., *"Experimental Stress Analysis"*, Tata McGraw-Hill, New Delhi, 1984.
2. Abdul Muben*, "Experimental Stress Analysis",* Dhanpat Rai & Co, First edition, 1987.
3. Window A. L., *"Strain Gauge Techniques",* Springer Publications, Second edition, 1992.

Course Objectives:

1. To make the student familiar with techniques of experimental stress analysis.
2. To study strain gauge bridge configurations and related instrumentation to take readings.
3. To use different polariscope arrangements along with auxiliary equipment required for photoelasicity.

Course Learning Outcomes:

CO	**After the completion of the course the student should be able to**	Bloom's Cognitive	
		level	Descriptor
CO1	Analyze the photoelastic data by various methods	IV	Analyzing
CO2	Determine the strains and stresses in photoelastic coating by using reflection polariscope.	V	Evaluating
CO3	Apply various methods and instrumentation for strain measurement.	III	Applying

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**
CO1	2		2			3
CO2	2		2			3
CO3	2		2			3

Assessments:

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE

Course Contents:

Module 1 Introduction to ESA	**6 Hrs.**
Introduction to ESA, Advantages of ESA techniques, Necessity of various ESA methods, methodology of problem solving by ESA. Introduction of few concepts of Mechanics of materials and preferably some understanding of the theory of elasticity.	
Module 2 Photo Elasticity	**8 Hrs.**
Theory of Photo Elasticity, Optics related to photo elasticity- Ordinary light, Monochromatic light, polarized light, natural and artificial birefringence, Stress optic law in two dimensions at normal incidence, material fringe value in terms of stress function, Polariscope – Plane polariscope, Circular polariscope, Different Arrangements, Effect of stressed model in plane polariscope – Isoclinics, Isochromatics, Effect of stressed model in circular polariscope– Isochromatics, Use of white light and determination of orders of isochromatic fringes seen in the circular polariscope, Fractional fringe measurement: (i) Tardy's Method (ii) Babinet Soleil Method. Criterion for selection of model materials, Properties of commonly employed photo elastic materials, Casting technique and machining of model, Conclusions pertaining to material selection, Calibration methods -circular disc, tensile specimen, beam model, Significance of material fringe value.	
Module 3 Methods of Analysis	**6 Hrs.**
Determination of direction of Principal stresses at given point, Determination of exact fringe order N and the principal stress difference ($\sigma 1 - \sigma 2$) at the given point, Separation methods: Method based on Hook's Law, Electrical analogy method, Oblique incidence method, Shear difference method. Scaling model results to prototype	
Module 4 Strain Measurement Using Strain Gauges	**6 Hrs.**
Introduction, types, construction and material, Gauge factor, cross or transverse sensitivity, correction for transverse strain effect, semiconductor strain gauge. Selection and Mountings of Strain Gauges: Grid, backing, adhesive, mounting methods, checking gauge installation, Moisture proofing. Strain Gauge\ Circuitry: Measurement of force or load, Measurement of torque, Strain measurement of rotating shaft, Measurement of pressure or vacuum.	
Module 5 Application of Strain Guages	**7 Hrs.**
Introduction, Analysis of strain gauge data by analytical and graphical methods, Analysis when principal stress directions are known, Analysis when principal stress directions are unknown, Delta rosette, Tee-rosette, Four element rectangular rosette, Rectangular rosette – Two and three element.	
Module 6 Brittle Coating and Moire Method	**7 Hrs.**
Brittle coating method - merits, demerits and applications, Moiré fringe method - merits, demerits and applications, Birefringent coating-principle and working of reflection polariscope	

Module wise Measurable Students Learning Outcomes:

After the completion of the course the student should be able to:

1. Explain the basics of stress, strain and the various methods of measurement.
2. Apply the knowledge of photoelasicity to find out isoclinic and isochromatic pattern.
3. Determine the strains and stresses in photoelastic coating by using reflection polariscope.
4. Design strain gauge transducers.
5. Apply various methods and instrumentation for strain measurement.
6. Demonstrate the brittle coating technique.

Title of the Course: PE5: PLM- Product Lifecycle Management, 3DE614 Professional Elective 5	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Bachelor degree in Mechanical / Production / Automobile Engineering

Textbooks:

1. Grieves Michael, Product Lifecycle Management- Driving the Next Generation of Lean Thinking, McGraw-Hill, 2006. ISBN 0071452303
2. Antti Saaksvuori, Anselmi Immonen, Product Life Cycle Management - Springer, 1st Edition (Nov.5, 2003)
3. Stark, John. Product Lifecycle Management: 21st Century Paradigm for Product Realization, Springer-Verlag, 2004. ISBN 1852338105
4. Kari Ulrich and Steven D. Eppinger, Product Design & Development, McGraw Hill International Edns, 1999.

References:

1. Product Design & Process Engineering, McGraw Hill – Kogalkusha Ltd., Tokyo, 1974.
2. Effective Product Design and Development – by Stephen Rosenthol, Business One Orwin, Homewood, 1992 ISBN 1-55623-603-4.
3. Clement, Jerry; Coldrick, Andy; & Sari, John. Manufacturing Data Structures, John Wiley & Sons, 1992. ISBN 0471132691.
4. Clements, Richard Barrett. Chapter 8 ("Design Control") and Chapter 9 ("Document Control") in Quality Manager's Complete Guide to ISO 9000, Prentice Hall, 1993. ISBN 013017534X.

Course Objectives:

1. To prepare students to develop products by technical and managerial and software skill.
2. To make the students familiar with increased product complexity and to maintain product quality.
3. To develop skills to identify the gaps between current product development process.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Discuss the importance and the concept of Product Lifecycle Management & its need.	2	Understanding
CO2	Exploit the methodology to Set the Product Lifecycle Management Vision & Develop Product Lifecycle Management strategy	3	Applying
CO3	Analyze the recent developments to perform product structure modelling with relationship	4	Analyzing

CO-PO Mapping:

PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1				1	2
CO2			2	3		1
CO3			2	3		1

Assessments:

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1	**6 Hrs.**
Product life cycle – Introduction, growth, maturity & decline, Product Lifecycle, Management-Definition & Overview, Background for Product Lifecycle Management-corporate challenges, Need of Product Lifecycle Management, Components/Elements of Product Lifecycle Management, Emergence of Product Lifecycle Management, Significance of Product Lifecycle Management - life cycle problems to be resolved.	
Module 2	**7 Hrs.**
Product Lifecycle Management Life cycle model- plan, design, build, support & dispose. Threads of Product Lifecycle Management computer aided design (CAD), engineering data management (EDM), Product data management (PDM), computer integrated manufacturing (CIM). Weaving the threads into Product Lifecycle Management, comparison of Product Lifecycle Management to Engineering resource planning (ERP). Product Lifecycle Management characteristics - singularity, cohesion, traceability, reflectiveness, Information Mirroring Model. External drivers- scale, complexity, cycle times, globalization & regulation. Internal drivers - productivity, innovation, collaboration & quality. Board room drivers – income, revenues & costs .	
Module 3	**6 Hrs.**
Collaborative Product Development, Mapping Requirements to specifications. Part Numbering, Engineering Vaulting, Product reuse, Engineering Change Management, Bill of Material and Process Consistency. Digital Mock up and Prototype development. Virtual testing and collateral. Introduction to Digital Manufacturing	
Module 4	**6 Hrs.**
Product life cycle management system- system architecture, Information models and product structure, Information model, the product information data model, the product model,	

functioning of the system. Reasons for the deployment of Product Lifecycle Management systems	
Module 5	**7 Hrs.**
Product Data issues – Access, applications, Archiving, Availability, Change, Confidentiality. Product Workflow, The Link between Product Data and Product Workflow, Key Management Issues around Product Data and Product Workflow, Company's Product Lifecycle Management vision, The Product Lifecycle Management Strategy, Principles for Product Lifecycle Management strategy, Preparing for the Product Lifecycle Management strategy.	
Module 6	**7 Hrs.**
Different phases of product lifecycle and corresponding technologies, Foundation technologies and standards e.g. visualization, collaboration and enterprise application integration, Core functions e.g., data vaults, document and content management, workflow and program management, Functional applications e.g., configuration management. Human resources in product lifecycle.	

Module wise Measurable Students Learning Outcomes:

After the completion of the course the student should be able to:

1. Explain the product life cycle background, corporate challenges, significance and its elements.
2. Decide the plan for Product Lifecycle Management model and integrate the different elements for Product Lifecycle Management execution
3. Identify the various requirements in product development process in consideration to digital manufacturing.
4. Identify the different architecture and different models for product development.
5. Identification of Product Lifecycle Management vision and understand the product data and workflow.
6. Evaluate the different phases of product lifecycle technologies through case study.

Professional Elective (Lab) Courses

There are no courses under this category for this semester.

Open Electives Courses

There are no courses under this category for this semester.

Mandatory Non Credit Courses

Title of the Course: Constitution of India 3IC601 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
2. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
3. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

References:

1. The Constitution of India, 1950 (Bare Act), Government Publication

Course Objectives :

The objectives of the course are:

1. To review and create awareness on various provisions in the constitution of India.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.	2	Understanding
CO2	Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.	2	Understanding
CO3	Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

Assessment	Marks
ISE 1	35
MSE	30
ISE 2	35

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

Course Contents:

Module 1	**4 Hrs.**
History of Making of the Indian Constitution Drafting Committee, (Composition & Working)	
Module 2 Philosophy of the Indian Constitution	**4 Hrs.**
Preamble, Salient Features	
Module 3 Contours of Constitutional Rights & Duties	**5 Hrs.**
Fundamental Rights; Right to Equality; Right to Freedom; Right against Exploitation; Right to Freedom of Religion; Cultural and Educational Rights; Right to Constitutional Remedies; Directive Principles of State Policy; Fundamental Duties.	
Module 4 Organs of Governance	**5 Hrs.**
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions	
Module 5 Local Administration	**5 Hrs.**
District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	
Module 6 Election Commission	**5 Hrs.**
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	

Title of the Course: Pedagogy Studies 3IC602 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
2. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
3. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
4. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
5. www.pratham.org/images/resource%20working%20paper%202.pdf.

References: 1. Alexander RJ, 2001, Culture and pedagogy: International comparisons in primary education, Oxford and Boston: Blackwell.
2. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

Course Objectives :

The objectives of the course are:

1. To discuss pedagogical practices being used by teachers in formal and informal classrooms in developing countries.
2. To provide the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners.
3. To explain teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Outline pedagogical practices, and existing evidence on the review topic to inform programme design and policy making undertaken.	2	Understanding
CO2	Explain critical evidence gaps to guide the development	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

Assessment	Marks
ISE 1	35
MSE	30
ISE 2	35
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc. MSE: Assessment is based on 50% of course content (Normally first three modules)	

Course Contents:

Module 1 Introduction and Methodology	**5Hrs.**
Aims and rationale, Policy background, Conceptual framework and Terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**,** Overview of methodology and Searching.	
Module 2	**5 Hrs.**
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	
Module 3	**5 Hrs.**
Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.	
Module 4	**5 Hrs.**
Professional development: alignment with classroom practices and follow-up support Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes	
Module 5	**5 Hrs.**
Research gaps and future directions Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment Dissemination and research impact.	

Title of the Course: Disaster Management 3IC603 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep &Deep

Course Objectives :

The objectives of the course are:

1. To impart knowledge for critical understanding of key concepts in disaster risk reduction and humanitarian response, and disaster management approaches
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of, planning and programming in different countries, particularly their home country or the countries they work in

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain disaster risk reduction and humanitarian response policy and practice from multiple perspectives	2	Understanding
CO2	Summarize standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	2	Understanding
CO3	Outline the strengths and weaknesses of disaster management approaches, planning and programming in different countries.	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

Assessment	Marks
ISE 1	35
MSE	30
ISE 2	35

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

Module 1 Introduction	**4 Hrs.**
Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.	
Module 2 Repercussions Of Disasters And Hazards	**4 Hrs.**
Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	
Module 3 Disaster Prone Areas In India	**4 Hrs.**
Study Of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	
Module 4 Disaster Preparedness And Management	**4 Hrs.**
Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.	
Module 5 Risk Assessment	**4 Hrs.**
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment and Warning, People's Participation In Risk Assessment. Strategies for Survival.	
Module 6 Disaster Mitigation	**4 Hrs.**
Meaning, Concept and Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	

Title of the Course: Value Education 3IC604 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

Course Objectives :

The objectives of the course are:

1. To impart knowledge on value of education and self- development.
2. To imbibe good values in students.
3. To highlight importance of character.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain value of education and self- development.	2	Understanding
CO2	Summarize importance of good character, and Behavior development.	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

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ISE 1	35
MSE	30
ISE 2	35

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

Module 1	**6Hrs.**
1. Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. 2. Moral and non- moral valuation. Standards and principles. 3. Value judgments	
Module 2	**6 Hrs.**
1. Importance of cultivation of values 2. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. 3. Honesty, Humanity. Power of faith, National Unity. 4. Patriotism. Love for nature, Discipline	
Module 3	**7 Hrs.**
1. Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. 2. Punctuality, Love and Kindness. 3. Avoid fault Thinking. 4. Free from anger, Dignity of labour. 5. Universal brotherhood and religious tolerance. 6. True friendship. 7. Happiness Vs suffering, love for truth. 8. Aware of self-destructive habits. 9. Association and Cooperation. 10. Doing best for saving nature	
Module 4	**7 Hrs.**
1. Character and Competence –Holy books vs Blind faith. 2. Self-management and Good health. 3. Science of reincarnation. 4. Equality, Nonviolence, Humility, Role of Women. 5. All religions and same message. 6. Mind your Mind, Self-control. 7. Honesty, Studying effectively	

Value Added
Professional Courses

There are no courses under this category for this semester.

EVEN Semester

Professional Core (Theory) Courses

There are no courses under this category for this semester.

Professional Core (Lab) Courses

Title of the Course: Dissertation Phase III (3DE693) and Dissertation Phase IV (3DE694 & 3DE695)	L	T	P	Cr
	0	0	8+24	4+4+8

Pre-Requisite Courses:

Textbooks: As per the research topic

References: National and International Journals

Course Objectives:

1. To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders.
2. Acquire knowledge to tackle real world problems of societal concerns.
3. Impart flexibility to the student to have increased control over his/ her learning.
4. Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor.
5. Enhance student's learning through increased interaction with peers and colleagues.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Search the existing literature and identification of research problem	IV	Analyzing
CO2	Design and develop the solution for complex engineering problem.	V	Evaluating
CO3	Create the new knowledge in the specialized field	VI	Creating

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1			1		2
CO2	1		1		2	2
CO3		2				2

Assessments:

Teacher Assessment:

In Semester Evaluation (ISE) and End Semester Evaluation (ESE)

Evaluation Scheme			
Scheme	Credits	Practical (Marks)	
		Max	Min for Passing
MSE	4	100	40
ISE 2	4	100	40
ESE	8	100	40

Course Contents:

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects in this semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Professional Elective (Theory) Courses

There are no courses under this category for this semester.

Professional Elective (Lab) Courses

There are no courses under this category for this semester.

Open Electives Courses

There are no courses under this category for this semester.

Mandatory Non Credit Courses

Title of the Course: Constitution of India 3IC601 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

4. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
5. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
6. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

References:

1. The Constitution of India, 1950 (Bare Act), Government Publication

Course Objectives :

The objectives of the course are:

2. To review and create awareness on various provisions in the constitution of India.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.	2	Understanding
CO2	Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.	2	Understanding
CO3	Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

Assessment	Marks
ISE 1	35
MSE	30
ISE 2	35

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

Course Contents:

Module 1	**4 Hrs.**
History of Making of the Indian Constitution Drafting Committee, (Composition & Working)	
Module 2 Philosophy of the Indian Constitution	**4 Hrs.**
Preamble, Salient Features	
Module 3 Contours of Constitutional Rights & Duties	**5 Hrs.**
Fundamental Rights; Right to Equality; Right to Freedom; Right against Exploitation; Right to Freedom of Religion; Cultural and Educational Rights; Right to Constitutional Remedies; Directive Principles of State Policy; Fundamental Duties.	
Module 4 Organs of Governance	**5 Hrs.**
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions	
Module 5 Local Administration	**5 Hrs.**
District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	
Module 6 Election Commission	**5 Hrs.**
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	

Title of the Course: Pedagogy Studies 3IC602 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
2. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
3. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
4. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
5. www.pratham.org/images/resource%20working%20paper%202.pdf.

References: 1. Alexander RJ, 2001, Culture and pedagogy: International comparisons in primary education, Oxford and Boston: Blackwell.
2. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

Course Objectives :

The objectives of the course are:

1. To discuss pedagogical practices being used by teachers in formal and informal classrooms in developing countries.
2. To provide the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners.
3. To explain teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive level	Descriptor
CO1	Outline pedagogical practices, and existing evidence on the review topic to inform programme design and policy making undertaken.	2	Understanding
CO2	Explain critical evidence gaps to guide the development	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and One Mid Semester Examination (MSE) having 35%, 35% and 30% weights respectively.

Assessment	Marks
ISE 1	35
MSE	30
ISE 2	35
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc. MSE: Assessment is based on 50% of course content (Normally first three modules)	

Course Contents:

Module 1 Introduction and Methodology	**5Hrs.**
Aims and rationale, Policy background, Conceptual framework and Terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**,** Overview of methodology and Searching.	
Module 2	**5 Hrs.**
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	
Module 3	**5 Hrs.**
Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.	
Module 4	**5 Hrs.**
Professional development: alignment with classroom practices and follow-up support Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes	
Module 5	**5 Hrs.**
Research gaps and future directions Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment Dissemination and research impact.	

Title of the Course: Disaster Management 3IC603 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

4. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
5. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
6. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep &Deep

Course Objectives :

The objectives of the course are:

5. To impart knowledge for critical understanding of key concepts in disaster risk reduction and humanitarian response, and disaster management approaches
6. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
7. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
8. Critically understand the strengths and weaknesses of, planning and programming in different countries, particularly their home country or the countries they work in

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain disaster risk reduction and humanitarian response policy and practice from multiple perspectives	2	Understanding
CO2	Summarize standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	2	Understanding
CO3	Outline the strengths and weaknesses of disaster management approaches, planning and programming in different countries.	2	Understanding

CO-PO Mapping :

	1	**2**	**3**	**4**	**5**	**6**
CO1						
CO2						
CO3						

Assessments :

Teacher Assessment:

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Module 1 Introduction	**4 Hrs.**
Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.	
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Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	
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Module 5 Risk Assessment	**4 Hrs.**
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment and Warning, People's Participation In Risk Assessment. Strategies for Survival.	
Module 6 Disaster Mitigation	**4 Hrs.**
Meaning, Concept and Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	

Title of the Course: Value Education 3IC604 **Mandatory Non Credit Course**	L	T	P	Cr
	02	-	-	-

Pre-Requisite Courses: -

Textbooks:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

Course Objectives :

The objectives of the course are:

1. To impart knowledge on value of education and self- development.
2. To imbibe good values in students.
3. To highlight importance of character.

Course Learning Outcomes:

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		level	Descriptor
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CO2	Summarize importance of good character, and Behavior development.	2	Understanding

CO-PO Mapping :

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11. Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. 12. Punctuality, Love and Kindness. 13. Avoid fault Thinking. 14. Free from anger, Dignity of labour. 15. Universal brotherhood and religious tolerance. 16. True friendship. 17. Happiness Vs suffering, love for truth. 18. Aware of self-destructive habits. 19. Association and Cooperation. 20. Doing best for saving nature	
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8. Character and Competence –Holy books vs Blind faith. 9. Self-management and Good health. 10. Science of reincarnation. 11. Equality, Nonviolence, Humility, Role of Women. 12. All religions and same message. 13. Mind your Mind, Self-control. 14. Honesty, Studying effectively	

Value Added
Professional Courses

There are no courses under this category for this semester.

This is Last Page