

# E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University,  
Chennai Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611002



## M.E. MANUFACTURING ENGINEERING

REGULATION -2021

First Year – **First Semester**

Course Category	Course Code	Course Name	L	T	P	C	Maximum Marks		
							CA	ES	Total
<b>Theory Course</b>									
FC	2101MF101	Probability and Statistics in Manufacturing	3	2	0	4	40	60	100
PCC	2102MF102	Modern Manufacturing Processes	3	0	0	3	40	60	100
PEC	2103MF001	Program Elective–I(Theory of Metal Forming)	3	0	0	3	40	60	100
PEC	2103MF007	Program Elective–II (Advanced Welding Technology)	3	0	0	3	40	60	100
RMC	2101RMX01	Research Methodology and IPR	3	0	0	3	40	60	100
AC		Audit Course – I	2	0	0	0	0	0	0
<b>Laboratory Course</b>									
PCC	2102MF103	Computer Aided Manufacturing Laboratory	0	0	4	2	50	50	100
PCC	2102MF104	Metal Forming and Metal Testing Laboratory	0	0	4	2	50	50	100
<b>Total</b>			<b>17</b>	<b>2</b>	<b>8</b>	<b>20</b>	<b>300</b>	<b>400</b>	<b>700</b>

2101MF101	PROBABILITY AND STATISTICS IN MANUFACTURING			L	T	P	C
				3	1	0	4
<b>COURSE OBJECTIVE</b>	<ul style="list-style-type: none"> <li>To understand the basics of random variables with emphasis on the standard discrete and continuous distributions.</li> <li>To introduce the concepts of sampling distributions and the test statistics.</li> <li>To provide an understanding of the statistical methods and concepts by which real life problems are analyzed.</li> <li>To analyze various data using statistical techniques.</li> <li>To train the students in design experiments and use these concepts for research.</li> </ul>						
<b>MODULE 1</b>	<b>PROBABILITY THEORY</b>					<b>12 Hours</b>	
Random variables – probability density and distribution functions-moment generating and characteristic functions – Binomial, Poisson, Normal distributions and their applications in manufacturing.							
<b>MODULE 2</b>	<b>SAMPLING THEORY</b>					<b>12 Hours</b>	
Sampling distributions – Standard error – t, F, Chi square distributions – applications in manufacturing.							
<b>MODULE 3</b>	<b>ESTIMATION THEORY</b>					<b>12 Hours</b>	
Interval estimation for population mean, standard deviation, difference in means, preparation ratio of standard deviations and variances- applications in manufacturing.							
<b>MODULE 4</b>	<b>TESTING OF HYPOTHESIS AND ANOVA</b>					<b>12 Hours</b>	
Hypothesis testing – Small samples – Tests concerning proportion, means, standard deviations – Tests based on chi square – and Redistribution test -Design of experiments - applications in manufacturing.							
<b>MODULE 5</b>	<b>ANOVA</b>					<b>12 Hours</b>	
Design of experiments – One, Two factor Models- applications in manufacturing							
					<b>Total:</b>	<b>60 Hours</b>	
<b>COURSE OUTCOME</b>	<p>CO1: Formulate and find optimal solution in the real life optimizing/allocation/assignment problems involving conditions and resource constraints.</p> <p>CO2 : Simulate appropriate application/distribution problems.</p> <p>CO3 : Obtain the value of the point estimators using the method of moments and method of maximum likelihood.</p> <p>CO4 : Apply the concept of various test statistics used in hypothesis testing for mean and variances of large and small samples.</p> <p>CO5 : Get exposure to the principal component analysis of random vectors and matrices.</p>						
<b>REFERENCES</b>	<ol style="list-style-type: none"> <li>Jay L.Devore, “Probability and Statistics for Engineering and the Sciences”, Cengage Learning, 9<sup>th</sup> Edition, Boston, 2016.</li> <li>Johnson, R.A, Irwin Miller and John Freund., “Miller and Freund’s Probability and Statistics for Engineers”, Pearson Education, 9<sup>th</sup> Edition, New York, 2016.</li> <li>Johnson, R.A., and Wichern, D.W., “Applied Multivariate Statistical Analysis”, Pearson Education, Sixth Edition, New Delhi, 2013.</li> <li>Ross. S.M., “Probability Models for Computer Science”, Academic Press, San Diego, 2002.</li> <li>Taha H.A.,, “Operations Research: An Introduction”, Prentice Hall of India Pvt.</li> </ol>						

2102MF102	MODERN MANUFACTURING PROCESSES	L	T	P	C
		3	0	0	3
<b>COURSE OBJECTIVE</b>	<ul style="list-style-type: none"> <li>To create awareness on Abrasive aided machining</li> <li>To understand electrical and electrochemical machining processes.</li> <li>To analyses the principles of high energy aided machining.</li> <li>To study the surface and bulk machining processes of silicon wafer.</li> <li>To introduce students to the major manufacture steps in electronic circuit boards.</li> </ul>				
<b>MODULE 1</b>	<b>ABRASIVE AIDED MACHINING PROCESSES</b>	<b>9 Hours</b>			
Abrasive machining – water jet machining - ultrasonic machining –Abrasive flow machining- Abrasive machining – water jet machining - ultrasonic machining –Abrasive flow machining- Magneto rheological Abrasive flow machining- construction working principle – steps - types – process parameters – derivations – problems, merits, demerits and applications .					
<b>MODULE 2</b>	<b>ELECTRICAL AND CHEMICAL AIDED MACHINING PROCESSES</b>	<b>9 Hours</b>			
Wire cut EDM - Electric discharge machining – Electrochemical machining – chemical machining– Mask ants - Electrochemical grinding - construction – principle – types – control - circuits – tool design – merits, demerits and applications. Hybrid Machining.					
<b>MODULE 3</b>	<b>HIGH ENERGY AIDED MACHINING PROCESSES</b>	<b>9 Hours</b>			
Laser beam machining – Electron beam machining – Plasma arc machining – Ion beam machining – construction working principle types – process parameter – derivations – problems, merits, demerits and applications.					
<b>MODULE 4</b>	<b>FABRICATION OF MICRO DEVICES</b>	<b>9 Hours</b>			
Semiconductors – Si wafer - planarization – Oxidation - diffusion – ion implantation – etching – metallization – bonding – surface and bulk machining – LIGA Process					
<b>MODULE 5</b>	<b>MICROFABRICATION TECHNOLOGY</b>	<b>9 Hours</b>			
Molding – PCB board hybrid and MCM technology – programmable devices and ASIC – electronic material and processing– stereo lithography – Solid free form fabrication -SAW devices, Surface Mount Technology					
				<b>Total:</b>	<b>45 Hours</b>
<b>COURSE OUTCOME</b>	CO1 : Understand and grasp the significance of modern machining process and its applications. CO2 : Identify the selection of machining process and its parameters. CO3 : Express and appreciate the cutting edge technologies and apply the same for research purposes. CO4 : Measure the stages involved in fabrication of micro devices. CO5 : Create new devices involved in micro fabrication and recent technology.				
<b>REFERENCES</b>	<ol style="list-style-type: none"> <li>Brahem T. Smith, Advanced Machining I.F.S. UK 2016.</li> <li>Jaeger R.C., Introduction to Microelectronic Fabrication Addison Wesley, 2ndEdition, 1998.</li> <li>Jain V K, Micromanufacturing Processes, CRC Press, 2012.</li> <li>Julian W. Gardner, Vijay K Varadan and Osama O Awadelkarim, Microsensors MEMS and Smart devices, John Willey, 2013.</li> <li>Pandey P.C. and Shan HS Modern Machining Processes, Standard Publishing Co., 1stEdition,1980.</li> <li>Serope Kalpakjian and Steven R. Schmid- Manufacturing Process for Engineering Material – Pearson Education, 6thEdition, 2018</li> </ol>				

2101RMX01		RESEARCH METHODOLOGY AND IPR				L	T	P	C
						3	0	0	3
<b>COURSE OBJECTIVE</b>		<ul style="list-style-type: none"> <li>• Problem formulation, analysis and solutions.</li> <li>• Technical paper writing / presentation without violating professional ethics</li> <li>• Patent drafting and filing patents.</li> </ul>							
<b>MODULE 1</b>	<b>RESEARCH PROBLEM FORMULATION</b>					<b>9 Hours</b>			
Meaning of research problem- Sources of research problem, criteria characteristics of a good research problem, errors in selecting a research problem, scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations									
<b>MODULE 2</b>	<b>LITERATURE REVIEW</b>					<b>9 Hours</b>			
Effective literature studies approaches, analysis, plagiarism, and research ethics.									
<b>MODULE 3</b>	<b>TECHNICAL WRITING /PRESENTATION</b>					<b>9 Hours</b>			
Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.									
<b>MODULE 4</b>	<b>INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR)</b>					<b>9 Hours</b>			
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.									
<b>MODULE 5</b>	<b>INTELLECTUAL PROPERTY RIGHTS (IPR)</b>					<b>9 Hours</b>			
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.									
						<b>Total :</b>	<b>45 Hours</b>		
<b>COURSE OUTCOME</b>	CO1 : To formulate research problem CO2 : To carry out research analysis CO3 : To follow research ethics CO4: To understand that today's world is controlled by computer, information technology, but tomorrow world will be ruled by ideas, concept, and creativity CO5 : To understand about IPR and filing patents in R & D.								
<b>REFERENCES</b>	1. Asimov, "Introduction to Design", Prentice Hall, 1962. 2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007. 3. Mayall, "Industrial Design", McGraw Hill, 1992. 4. Niebel, "Product Design", McGraw Hill, 1974. 5. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners" 2010								

**PROGRAM ELECTIVE-I**

2103MF001	THEORY OF METAL FORMING	L	T	P	C
		3	0	0	3
<b>MODULE 1</b>	<b>THEORY OF PLASTICITY</b>				<b>9 Hours</b>
Theory of plastic deformation – Yield criteria – Tresca and Von-Mises – Distortion energy – Stress- strain relation – Mohr’s circle representation of a state of stress – cylindrical and spherical co-ordinate system – upper and lower bound solution methods – Overview of FEM applications in Metal Forming analysis.					
<b>MODULE 2</b>	<b>THEORY AND PRACTICE OF BULK FORMING PROCESSES</b>				<b>9 HOURS</b>
Analysis of plastic deformation in Forging, Rolling, Extrusion, rod/wire drawing and tube drawing – Effect of friction – calculation of forces, work done – Process parameters, equipment used – Defects – applications – Recent advances in Forging, Rolling, Extrusion and Drawing processes – Design consideration in forming.					
<b>MODULE 3</b>	<b>SHEET METAL FORMING</b>				<b>9 Hours</b>
Formability studies – Conventional processes – High energy rate forming ( <b>HERF</b> ) techniques – Superplastic forming techniques – Hydro forming – Stretch forming – Water hammer forming – Principles and process parameters – Advantage, Limitations and application – Incremental forming.					
<b>MODULE 4</b>	<b>POWDER METALLURGY AND SPECIAL FORMING PROCESSES</b>				<b>9 Hours</b>
Overview of P/M technique – Advantages – applications – Powder preform forging – powder rolling – Tooling, process parameters and applications. - Orbital forging – Isothermal forging – Hot and cold isotactic pressing – High speed extrusion – Rubber pad forming – Fine blanking – LASER beam forming					
<b>MODULE 5</b>	<b>SURFACE TREATMENT AND METAL FORMING APPLICATIONS</b>				<b>9 Hours</b>
Experiment techniques of evaluation of friction in metal forming selection – influence of temperature and gliding velocity – Friction heat generation – Friction between metallic layers – Lubrication carrier layer – Surface treatment for drawing, sheet metal forming, Extrusion, hot and cold forging. Processing of thin Al tapes – Cladding of Al alloys – Duplex and triplex steel rolling – Thermo mechanical regimes of Ti and Al alloys during deformation – Formability of welded blank sheet – Laser structured steel sheet - Formability of laminated sheet.					
				<b>TOTAL:</b>	<b>45 Hours</b>
<b>REFERENCES</b>	<ol style="list-style-type: none"> <li>Altan T, Metal forming – Fundamentals and applications – American Society of Metals, Metalspark,1983.</li> <li>Helmi A Youssef, Hassan A. El-Hofy, Manufacturing Technology: Materials, Processes and Equipment, CRC publication press, 1<sup>st</sup>Edition,2017.</li> <li>Marciniak Z, Duncan J.L, Hu S.J, Mechanics of Sheet Metal Forming, Butterworth-Heinemann,2<sup>nd</sup>Edition, 2002.</li> <li>Nagpal G.R, Metal Forming Processes, Khanna publishers, 2005.</li> <li>Shiro Kobayashi, Soo-Ik-Oh-Altan T, Metal forming and Finite Element Method, Oxford University Press,1989.</li> <li>Surender kumar, Technology of Metal Forming Processes, Prentice Hall India Publishers,1<sup>st</sup> Edition,2008.</li> </ol>				

**PROGRAM ELECTIVE-II**

2103MF007		ADVANCED WELDING TECHNOLOGY			
		3	0	0	3
<b>MODULE 1</b>	<b>ARC AND GAS WELDING PROCESSES</b>				<b>9 Hours</b>
Fundamental Principles – Air Acetylene Welding, Oxyacetylene Welding, Carbon Arc Welding, Shielded Metal Arc Welding, Submerged Arc Welding, TIG and MIG Welding, Plasma Arc Welding and Electro slag Welding Processes– Advantages, Limitations and Applications - Spot Welding, Seam Welding, Projection Welding, Resistance Butt Welding, Flash Butt Welding, Percussion Welding and High Frequency Resistance Welding Processes – Advantages, Limitations and Applications – Robotic Welding					
<b>MODULE 2</b>	<b>SOLID STATE AND SPECIAL WELDING PROCESSES</b>				<b>9 Hours</b>
Cold Welding, Diffusion Bonding, Explosive Welding, Ultrasonic Welding, Friction Welding, Friction Stir Welding- Forge Welding, Roll Welding and Hot Pressure Welding Processes – Advantages, Limitations and Applications - Thermite Welding, Atomic Hydrogen Welding, Electron Beam Welding, Laser Beam Welding, Friction Stir Welding, Under Water Welding, Welding Automation In Aerospace, Nuclear and Surface Transport Vehicles.					
<b>MODULE 3</b>	<b>WELDING METALLURGY</b>				<b>9 Hours</b>
geometry, plate thickness, preheat, significance of thermal severity number, Epitaxial growth - weld metal solidification - columnar structures and growth morphology effect of welding parameters - absorption of gases - gas/metal and slag/metal reactions, Phase transformations- weld CCT diagrams-carbon equivalent-preheating and post heating weld ability of low alloy steels, welding of stainless steels use of Schaffer and DeLong diagrams, welding of cast irons - Welding of Cu, Al, Ti and Ni alloys – processes, difficulties, microstructures, defects and remedial measures, Origin - types -process induced defects, - significance - remedial measures, Hot cracking - cold cracking -lamellar tearing - reheat cracking – weld ability tests - effect of metallurgical parameters,.					
<b>MODULE 4</b>	<b>DESIGN OF WELDMENTS</b>				<b>9 Hours</b>
Type of joints, joint efficiency, factor of safety, symbols, selection of edge preparation, design considerations, types of loading, Permissible stress, allowable defects, computation of stresses in welds, weld size calculation, code requirement for statically loaded structures - Design for fluctuating and impact loading - dynamic behavior of joints – stress, concentrations - fatigue analysis fatigue improvement techniques - permissible stress- life prediction, Concept of stress intensity factors - LEFM and EPFM concepts - brittle fracture- transition, temperature approach - fracture toughness testing, application of fracture mechanics to fatigue Welding residual stresses - causes, occurrence, effects and measurements - thermal and mechanical relieving; types of distortion - factors affecting distortion - distortion control methods - prediction - correction, jigs, fixtures and positioners					
<b>MODULE 5</b>	<b>WELDING DEFECTS AND INSPECTION</b>				<b>9 Hours</b>
Classification of weld defects- General sources of weld defects- Arc welding defects- Weld defects in other than Arc welding processes. Resistance welding defects- Defects in Friction welding- Defects in friction stir welding - Defects in welds of other welding processes-Visual Inspection-Liquid Penetrant Inspection- Magnetic particle inspection- Ultra sonic testing(UT) Radiography testing (RT) - Eddy current testing –Thermography- Optical and Acoustical holography.					
				<b>TOTAL:</b>	<b>45 Hours</b>
<b>REFERENCES</b>	<ol style="list-style-type: none"> <li>Baldev Raj, Practical Non – Destructive Testing, Narosa Publishing House,2009.</li> <li>Lancaster J.F, Metallurgy of Welding, Abington Publishing,6<sup>th</sup> Edition, 1999.</li> <li>Linnert G. E.,‘Welding Metallurgy’, Volume I and II, AWS,4<sup>th</sup>Edition, 1994</li> <li>Mishra. R.S and Mahoney. M.W, Friction Stir Welding and Processing, ASM,2007</li> <li>Parmer R.S., “Welding Engineering and Technology”, Khanna Publishers,1<sup>st</sup>Edition New Delhi,2008.</li> <li>Welding Handbook, Volume 2, 7<sup>th</sup>Edition, American Welding Society</li> </ol>				

2102MF103	COMPUTER AIDED MANUFACTURING LAB	L	T	P	C
		0	0	4	2
<b>AIM:</b>					
<ul style="list-style-type: none"> <li>To impart the knowledge on training the students in the area of CAM</li> <li>To teach the students about programming of CNC machines</li> <li>To train them to use the various sensors</li> </ul>					
<b>EXPERIMENTS:</b>					
<ol style="list-style-type: none"> <li>Exercise on CNC Lathe: Plain Turning, Step turning, Taper turning, Threading, Grooving &amp; canned cycle</li> <li>Exercise on CNC Milling Machine: Profile Milling, Mirroring, Scaling &amp; canned cycle.</li> <li>Study of Sensors, Transducers &amp; PLC: Hall-effect sensor, Pressure sensors, Strain gauge, PLC, LVDT, Load cell, Angular potentiometer, Torque, Temperature &amp; Optical Transducers.</li> </ol>					
				<b>Total :</b>	<b>60 Hours</b>
<b>OUTCOMES:</b>					
<p>Students will be able to</p> <p>CO1 : Understand and grasp the significance of modern machining process and its applications through hands-on experience.</p> <p>CO2 : Identify the selection of machining processes and its process parameters.</p> <p>CO3 : Express and perform project related works.</p>					

2102MF104	METAL FORMING AND METAL TESTING LABORATORY	L	T	P	C
		0	0	4	2
<b>AIM:</b>					
<ul style="list-style-type: none"> <li>To impart practical knowledge on bulk metal forming and sheet metal forming processes</li> </ul>					
<b>OBJECTIVE</b>					
<ul style="list-style-type: none"> <li>To train the students to have an hands on having the basic concepts of metal forming processes and to determine some metal forming parameters for a given shape.</li> </ul>					
<b>EXPERIMENTS</b>					
<ol style="list-style-type: none"> <li>Determination of strain hardening exponent</li> <li>Determination of strain rate sensitivity index</li> <li>Determination of efficiency in water hammer forming</li> <li>Determination of interface friction factor</li> <li>Study on rolling process</li> <li>Determination of torque and force measurement in rolling mill.</li> <li>Analysis of cutting forces on a lathe.</li> <li>Measurement of torque on milling machine.</li> </ol>					
<b>TOTAL: 60 Hours</b>					
<b>OUTCOMES:</b>					
<p>Students will be able to</p> <p>CO1 : Understand and grasp the significance of modern machining process and its applications through hands-on experience.</p> <p>CO2 : Identify the selection of machining processes and its process parameters.</p> <p>CO3 : Express and perform project related works.</p>					



**AUDIT COURSES**

2101AU001	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C	
		2	0	0	0	
<b>COURSE OBJECTIVES:</b>						
	1. Teach how to improve writing skills and level of readability					
	2. Tell about what to write in each section					
	3. Summarize the skills needed when writing a Title					
	4. Infer the skills needed when writing the Conclusion					
	5. Ensure the quality of paper at very first-time submission					
<b>MODULE I</b>	<b>INTRODUCTION TO RESEARCH PAPER WRITING</b>	<b>6 Hours</b>				
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness						
<b>MODULE II</b>	<b>PRESENTATION SKILLS</b>	<b>6 Hours</b>				
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction						
<b>MODULE III</b>	<b>TITLE WRITING SKILLS</b>	<b>6 Hours</b>				
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check						
<b>MODULE IV</b>	<b>RESULT WRITING SKILLS</b>	<b>6 Hours</b>				
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions						
<b>MODULE V</b>	<b>VERIFICATION SKILLS</b>	<b>6 Hours</b>				
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission						
				<b>Total:</b>	<b>30 Hours</b>	
<b>FURTHER READING:</b> -						
<b>COURSE OUTCOMES:</b>						
CO1	Understand that how to improve your writing skills and level of readability					
CO2	Learn about what to write in each section					
CO3	Understand the skills needed when writing a Title					
CO4	Understand the skills needed when writing the Conclusion					
CO5	Ensure the good quality of paper at very first-time submission					
<b>References:</b>						
1. R. Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies ““New Royal book Company.						
2. Sahni, Pardeep Et. 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 Publication Pvt. Ltd., New Delhi.						

2101AU002	DISASTER MANAGEMENT			L	T	P	C
				2	0	0	0
<b>COURSE OBJECTIVES:</b>							
	1. Summarize basics of disaster						
	2. Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.						
	3. Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.						
	4. Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.						
	5. Develop the strengths and weaknesses of disaster management approaches						
<b>MODULE I</b>	<b>INTRODUCTION</b>					<b>6 Hours</b>	
Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude							
<b>MODULE II</b>	<b>REPERCUSSIONS OF DISASTERS AND HAZARDS</b>					<b>6 Hours</b>	
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.							
<b>MODULE III</b>	<b>DISASTER PRONE AREAS IN INDIA</b>					<b>6 Hours</b>	
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							
<b>MODULE IV</b>	<b>DISASTER PREPAREDNESS AND MANAGEMENT</b>					<b>6 Hours</b>	
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 CommMODULEy Preparedness.							
<b>MODULE V</b>	<b>RISK ASSESSMENT</b>					<b>6 Hours</b>	
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							
						<b>Total:</b>	<b>30 Hours</b>
<b>FURTHER READING:</b> -							
<b>COURSE OUTCOMES:</b>							
CO1	Ability to summarize basics of disaster						
CO2	Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.						
CO3	Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.						
CO4	Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.						
CO5	Ability to develop the strengths and weaknesses of disaster management approaches						
<b>REFERENCES:</b>							
1. Goel S. L., Disaster Administration And Management Text And Case Studies”,Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.							
2. NishithaRai, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “”NewRoyal Book Company,2007.							
3. Sahni, PardeepEt.Al. ,” Disaster Mitigation Experiences And Reflections”, Prentice Hall OfIndia, New Delhi,2001.							

2101AU003	SANSKRIT FOR TECHNICAL KNOWLEDGE				L	T	P	C	
					2	0	0	0	
<b>COURSE OBJECTIVES:</b>									
1. Illustrate the basic Sanskrit language									
2. Recognize Sanskrit, the scientific language in the world.									
3. Appraise learning of Sanskrit to improve brain functioning.									
4. Relate Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.									
5. Extract huge knowledge from ancient literature.									
<b>MODULE I</b>	<b>ALPHABETS</b>							<b>6 Hours</b>	
Alphabets in Sanskrit									
<b>MODULE II</b>	<b>TENSES AND SENTENCES</b>							<b>6 Hours</b>	
Past/Present/Future Tense - Simple Sentences									
<b>MODULE III</b>	<b>ORDER AND ROOTS</b>							<b>6 Hours</b>	
Order - Introduction of roots									
<b>MODULE IV</b>	<b>SANSKRIT LITERATURE</b>							<b>6 Hours</b>	
Technical information about Sanskrit Literature									
<b>MODULE V</b>	<b>TECHNICAL CONCEPTS OF ENGINEERING</b>							<b>6 Hours</b>	
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics									
							<b>Total:</b>	<b>30 Hours</b>	
<b>FURTHER READING:</b> -									
<b>COURSE OUTCOMES:</b>									
CO1	Understanding basic Sanskrit language								
CO2	Write sentences								
CO3	Know the order and roots of Sanskrit.								
CO4	Know about technical information about Sanskrit literature								
CO5	Understand the technical concepts of Engineering								
<b>References:</b>									
1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi									
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya SanskritSansthanam, New Delhi Publication									
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi, 2017.									

2101AU004	VALUE EDUCATION	L	T	P	C
		2	0	0	0
<b>COURSE OBJECTIVES:</b>					
	1. Understand value of education and self-development				
	2. Imbibe good values in students				
	3. Let the should know about the importance of character				
<b>MODULE I</b>		<b>6 Hours</b>			
Values and self-development–Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgment's					
<b>MODULE II</b>		<b>8 Hours</b>			
Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, Nationally Patriotism. Love for nature, Discipline					
<b>MODULE III</b>		<b>8 Hours</b>			
Personality and Behavior Development-Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labor. Universal brother hood and religious tolerance. True friendship. Happiness vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature					
<b>MODULE IV</b>		<b>8 Hours</b>			
Character and Competence–Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.					
				<b>Total:</b>	<b>30 Hours</b>
<b>FURTHER READING:</b>	-				
<b>COURSE OUTCOMES:</b>					
CO1	Knowledge of self-development				
CO2	Learn the importance of Human values				
CO3	Developing the overall personality.				
<b>REFERENCES:</b>					
1. Chakroborty, S.K.“Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi					

2101AU005	CONSTITUTION OF INDIA			L	T	P	C
<b>COURSE OBJECTIVES:</b>							
2. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective							
3. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional							
4. Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.							
5. To 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.							
<b>MODULE I</b>	<b>HISTORY OF MAKING OF THE INDIAN CONSTITUTION:</b>			<b>5 Hours</b>			
History, Drafting Committee, (Composition & Working)							
<b>MODULE II</b>	<b>PHILOSOPHY OF THE INDIAN CONSTITUTION:</b>			<b>5 Hours</b>			
Preamble, Salient Features							
<b>MODULE III</b>	<b>CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES:</b>			<b>5 Hours</b>			
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.							
<b>MODULE IV</b>	<b>ORGANS OF GOVERNANCE:</b>			<b>5 Hours</b>			
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.							
<b>MODULE V</b>	<b>LOCAL ADMINISTRATION:</b>			<b>5 Hours</b>			
District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.							
<b>MODULE VI</b>	<b>ELECTION COMMISSION:</b>			<b>5 Hours</b>			
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.							
						<b>Total:</b>	<b>30 Hours</b>
<b>FURTHER READING:</b> -							
<b>COURSE OUTCOMES:</b>							
CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.						
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization						
CO3	of social reforms leading to revolution in India.						
CO4	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.						
CO5	Discuss the passage of the Hindu Code Bill of 1956.						
<b>REFERENCES:</b>							
1. The Constitution of India, 1950 (Bare Act), Government Publication.							
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution, 1 <sup>st</sup> Edition, 2015.							
3. M.P. Jain, Indian Constitution Law, 7 <sup>th</sup> Edn., Lexis Nexis, 2014.							
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.							

2101AU006	PEDAGOGY STUDIES			L	T	P	C	
				2	0	0	0	
<b>COURSE OBJECTIVES:</b>								
1. Review existing evidence on their view topic to inform programmed design and policy								
2. Making under taken by the DfID, other agencies and researchers.								
3. Identify critical evidence gaps to guide the development.								
<b>MODULE I</b>	<b>INTRODUCTION AND METHODOLOGY:</b>						<b>6 Hours</b>	
Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.								
<b>MODULE II</b>	<b>THEMATIC OVERVIEW</b>						<b>6 Hours</b>	
Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.								
<b>MODULE III</b>	<b>EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGIC PRACTICES</b>						<b>6 Hours</b>	
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.								
<b>MODULE IV</b>	<b>PROFESSIONAL DEVELOPMENT</b>						<b>6 Hours</b>	
Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the comm MODULEy - Curriculum and assessment - Barriers to learning: limited resources and large class sizes								
<b>MODULE V</b>	<b>RESEARCH GAPS AND FUTURE DIRECTIONS</b>						<b>6 Hours</b>	
Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.								
						<b>Total:</b>	<b>30 Hours</b>	
<b>FURTHER READING:</b> -								
<b>COURSE OUTCOMES:</b>								
CO1	What pedagogical practices are being used by teachers informal and informal classrooms in developing countries?							
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?							
CO3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?							
<b>REFERENCES:</b>								
1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245- 261.								
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36(3):361-379.								
3. Akyeampong K (2003) Teacher training in Ghana-does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.								
4. 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.								
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.								
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.								
7. <a href="http://www.pratham.org/images/resource%20working%20paper%202.pdf">www.pratham.org/images/resource%20working%20paper%202.pdf</a>								

2101AU007	STRESS MANAGEMENT BY YOGA			L	T	P	C
				2	0	0	0
<b>COURSE OBJECTIVES:</b>							
1. To achieve overall health of body and mind							
2. To overcome stress							
<b>MODULE I</b>							<b>10 Hours</b>
Eight parts of yoga.(Ashtanga)							
<b>MODULE II</b>							<b>10 Hours</b>
Yam and Niyam - Do`s and Don`t`s in life - i) Ahinsa, satya, astheya, bramhacharya and aparigraha,							
<b>MODULE III</b>							<b>10 Hours</b>
Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization of breathing techniques and its effects-Types of pranayam							
						<b>Total:</b>	<b>30 Hours</b>
<b>FURTHER READING:</b>	-						
<b>COURSE OUTCOMES:</b>							
CO1	Develop healthy mind in a healthy body thus improving social health also						
CO2	Improve efficiency						
<b>REFERENCES:</b>							
1. Yogic Asanas for Group Training-Part-I”:Janardan Swami Yoga bhyasi Mandal, Nagpur							
2. Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata							

2101AU008	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS			L	T	P	C
				2	0	0	0
<b>COURSE OBJECTIVES:</b>							
1. To learn to achieve the highest goal happily							
2. To become a person with stable mind, pleasing personality and determination							
3. To awaken wisdom in students							
<b>MODULE I</b>						<b>10 Hours</b>	
Neetisatakam-holistic development of personality - Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)							
<b>MODULE II</b>						<b>10 Hours</b>	
Approach to day to day work and duties - Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3- Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48.							
<b>MODULE III</b>						<b>10 Hours</b>	
Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 - Personality of role model - shrimad bhagwad geeta - Chapter2- Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4- Verses 18, 38,39 Chapter18 – Verses 37,38,63							
						<b>Total:</b>	<b>30 Hours</b>
<b>FURTHER READING:</b> -							
<b>COURSE OUTCOMES:</b>							
CO1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life						
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity						
CO3	Study of Neet is hatakam will help in developing versatile personality of students.						
<b>REFERENCES:</b>							
1. Gopinath, Rashtriya Sanskrit Sansthanam P, Bhartrihari's Three Satakam, Niti- sringar-vairagya, New Delhi,2010							
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram, Publication Department,Kolkata, 2016.							



2101AU009	UNNAT BHARAT ABHIYAN	L	T	P	C
		2	0	0	0
<b>COURSE OBJECTIVES:</b>					
	<p>1. Unnat Bharat Abhiyan is inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India.</p> <p>2. The Mission of Unnat Bharat Abhiyan is to enable higher educational institutions to work with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth.</p> <p>3. It also aims to create a virtuous cycle between society and an inclusive academic system by providing knowledge and practices for emerging professions and to upgrade the capabilities of both the public and the private sectors in responding to the development needs of rural India</p>				
<b>MODULE 1</b>		<b>10 Hours</b>			
Introduction. Holistic development of a village – Economic, Social, Human, Governance, Basic Amenities, Environmental aspects. Vision and mission of UBA. Activities of Unnat Bharat Abhiyan. Expediting the process of indigenous, sustainable rural development with effective support from professional institutes of higher education. Building capacity in institutes of Higher Education for research, training and development of technologies relevant to national needs, especially those of rural India. Creating the Requisite Structure to Cope with the Challenge.					
<b>MODULE 2</b>		<b>10 Hours</b>			
National Steering Committee for UBA (NSC - UBA). The Coordinating Institution for UBA (CI-UBA) and its Responsibilities. Identification and Role of Mentoring Institutions (MI - UBA). Identification and Role of Subject Expert Groups (SEG - UBA). UBA Participating Institutions in General (PIs - UBA).					
<b>MODULE 3</b>		<b>10 Hours</b>			
Methodology of Intervention and Monitoring. Expected outcomes from UBA. Mechanism for Providing the Base-level funding from MHRD. Various Sources of Funding for the Actual Cluster Development Work. Status of Steps Already Completed towards Setting up the Structural Network of UBA. Major activities so far. Action Plans.					
				<b>Total:</b>	<b>30 Hours</b>
<b>REFERENCES:</b>					
1. <a href="https://www.rcisgbau.in/pdf/UBA_concept_note.pdf">https://www.rcisgbau.in/pdf/UBA_concept_note.pdf</a>					
2. <a href="https://unnatbharatabhiyan.gov.in/documents">https://unnatbharatabhiyan.gov.in/documents</a>					
3. <a href="https://unnatbharatabhiyan.gov.in:8443/introduction">https://unnatbharatabhiyan.gov.in:8443/introduction</a>					
4. <a href="https://unnatbharatabhiyan.gov.in:8443/new-website/https://unnatbharatabhiyan.gov.in:8443/app/webroot/files/general_documents/Unnat%20Bharat%20Abhiyan-%20Brochure%202016.pdf">https://unnatbharatabhiyan.gov.in:8443/new-website/https://unnatbharatabhiyan.gov.in:8443/app/webroot/files/general_documents/Unnat%20Bharat%20Abhiyan-%20Brochure%202016.pdf</a>					