

# 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. ENVIRONMENTAL ENGINEERING

REGULATION -2021

#### First Year – Second Semester

Course Category	Course Code	Course Name	L	T	P	C	Maximum Marks		
							CA	ES	Total
<b>Theory Course</b>									
PCC	2102EV201	Principles and Design of Biological Treatment Systems	3	0	0	3	40	60	100
PCC	2102EV202	Industrial Waste Management	3	0	0	3	40	60	100
PEC	2103EV004	Air Pollution Monitoring and Control (Program Elective–II)	3	0	0	3	40	60	100
PEC	2103EV007	Solid and Hazardous Waste Management (Program Elective–III)	3	0	0	3	40	60	100
AC		Audit Course–II	2	0	0	0	100	00	100
<b>Laboratory Course</b>									
PCC	2102EV203	Module Operations and Processes Laboratory	0	0	4	2	50	50	100
EEC	2104EV204	Mini Project with Seminar	0	0	4	2	50	50	100
<b>Total</b>			<b>17</b>	<b>0</b>	<b>8</b>	<b>19</b>	<b>400</b>	<b>400</b>	<b>800</b>

<b>PCC</b>		<b>PRINCIPLES AND DESIGN OF BIOLOGICAL TREATMENT SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2102EV201</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Course Objectives:</b>						
	1. To educate the students on the principles and process designs of various treatment systems for water and wastewater and students should gain competency in the process employed in design of treatment systems and the components comprising such systems, leading to the selection of specific process.					
<b>Module I</b>	<b>INTRODUCTION</b>					<b>10 Hours</b>
Objectives of biological treatment – significance – Principles of aerobic and anaerobic treatment - kinetics of biological growth – Factors affecting growth – attached and suspended growth - Determination of Kinetic coefficients for organics removal – Biodegradability assessment -selection of process- reactors-batch-continuous type.						
<b>Module II</b>	<b>Aerobic Treatment of Wastewater</b>					<b>10 Hours</b>
Design of sewage treatment plant Modules –Activated Sludge process and variations, Sequencing Batch reactors, Membrane Biological Reactors-Trickling Filters-Bio Tower-RBC-Moving Bed Reactors-fluidized bed reactors, aerated lagoons, waste stabilization ponds – nutrient removal systems – natural treatment systems, constructed wet land – Disinfection – disposal options – reclamation and reuse – Flow charts, layout, PID, hydraulic profile, recent trends.						
<b>Module III</b>						<b>10 Hours</b>
Attached and suspended growth, Design of Modules – UASB, up flow filters, Fluidized beds MBR, septic tank and disposal – Nutrient removal systems – Flow chart, Layout and Hydraulic profile – Recent trends.						
<b>Module IV</b>	<b>Sludge Treatment and Disposal</b>					<b>5 Hours</b>
Design of sludge management facilities, sludge thickening, sludge digestion, biogas generation, sludge dewatering (mechanical and gravity) Layout, PID, hydraulics profile – upgrading existing plants – ultimate residue disposal – recent advances.						
<b>Module V</b>	<b>Construction Operations and Maintenance Aspects</b>					<b>10 Hours</b>
Construction and Operational Maintenance problems – Trouble shooting – Planning, Organizing and controlling of plant operations – capacity building - Retrofitting Case studies – sewage treatment plants – sludge management facilities.						
					<b>Total:</b>	<b>45 Hours</b>
<b>Course Outcomes:</b>						
	After completion of the course, Student will be able to					
	1. Develop conceptual schematics required for biological treatment of wastewater					
	2. Translate pertinent criteria into system requirements.					
<b>References:</b>						
1. Arceivala, S.J., Wastewater Treatment for Pollution Control, TMH, New Delhi, Second Edition, 2000.						
2. Manual on “Sewerage and Sewage Treatment” CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.						
3. Metcalf & Eddy, INC, „Wastewater Engineering – Treatment and Reuse, Fourth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2003.						
4. F.R. Spellman, Hand Book of Water and Wastewater Treatment Plant operations, CRC Press, New York (2009).						

<b>PCC</b>		<b>INDUSTRIAL WASTE MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2102EV202</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Course Objectives:</b>						
	To impart knowledge on the concept and application of Industrial pollution prevention, cleaner technologies, industrial wastewater treatment and residue management.					
<b>Module I</b>	<b>Introduction</b>					<b>8 Hours</b>
Industrial scenario in India– Industrial activity and Environment - Uses of Water by industry – Sources and types of industrial wastewater – Nature and Origin of Pollutants - Industrial wastewater and environmental impacts – Regulatory requirements for treatment of industrial wastewater – Industrial waste survey – Industrial wastewater monitoring and sampling -generation rates, characterization and variables –Toxicity of industrial effluents and Bioassay tests – Major issues on water quality management.						
<b>Module II</b>	<b>Industrial Pollution Prevention &amp; Waste Minimization</b>					<b>8 Hours</b>
Prevention vis a vis Control of Industrial Pollution – Benefits and Barriers – Waste management Hierarchy - Source reduction techniques – Periodic Waste Minimization Assessments – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay-back period – Implementing & Promoting Pollution Prevention Programs in Industries.						
<b>Module III</b>	<b>Industrial Wastewater Treatment</b>					<b>10 Hours</b>
Flow and Load Equalization – Solids Separation – Removal of Fats, Oil & Grease- Neutralization – Removal of Inorganic Constituents – Precipitation, Heavy metal removal , Nitrogen & Phosphorous removal, Ion exchange, Adsorption, Membrane Filtration, Eletrodialysis& Evaporation – Removal of Organic Constituents – Biological treatment Processes, Chemical Oxidation Processes, Advanced Oxidation processes – Treatability Studies.						
<b>Module IV</b>	<b>Wastewater Reuse and Residual Management</b>					<b>9 Hours</b>
Individual and Common Effluent Treatment Plants – Joint treatment of industrial and domestic wastewater - Zero effluent discharge systems - Quality requirements for Wastewater reuse – Industrial reuse , Present status and issues - Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge – Management of RO rejects.						
<b>Module V</b>	<b>Case Studies</b>					<b>10 Hours</b>
Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Oil Refining – Pharmaceuticals – Sugar and Distilleries						
					<b>Total:</b>	<b>45 Hours</b>
<b>Course Outcomes:</b>						
	After completion of the course, Student will be able to					
	1. Define the Principles of pollution prevention and mechanism of oxidation processes.					
	2. Suggest the suitable technologies for the treatment of wastewater.					
	3. Discuss about the wastewater characteristics					
	4. Design the treatment systems					
<b>References:</b>						
1. Industrial wastewater management, treatment & disposal, Water Environment						
2. LawranceK.Wang, Yung .Tse Hung, Howard H.Lo and Constantine Yapijakis, “ handlook of Industrial and Hazardous waste Treatment”, Second Edition, 2004.						
3. Metcalf & Eddy/ AECOM, water reuse Issues, Technologies and Applications, The McGraw- Hill companies, 2007.						
4. Nelson Leonard Nemerow, “industrial waste Treatment”, Elsevier, 2007.						
5. W.Wesley Eckenfelder, “Industrial Water Pollution Control”, Second Edition, McGraw Hill, 1989.						
6. Paul L. Bishop, „Pollution Prevention: - Fundamentals and Practice“, Mc-Graw Hill International, Boston, 2000.						

PEC	SOLID AND HAZARDOUS WASTE MANAGEMENT			L	T	P	C
2103EV007				3	0	0	3
<b>Course Objectives:</b>							
		To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for solid wastes including the related engineering principles, design criteria, methods and equipment.					
<b>Module I</b>	<b>Sources, Classification and Regulatory Framework</b>			<b>9 Hours</b>			
Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management -- Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes , plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management.							
<b>Module II</b>	<b>Waste Characterization and Source Reduction</b>			<b>8 Hours</b>			
Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse.							
<b>Module III</b>	<b>Storage, Collection and Transport Of Wastes</b>			<b>9 Hours</b>			
Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.							
<b>Module IV</b>	<b>Waste Processing Technologies</b>			<b>10 Hours</b>			
Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes - Health considerations in the context of operation of facilities, handling of materials and impact of outputs on the environment.							
<b>Module V</b>	<b>Waste Disposal</b>			<b>9 Hours</b>			
Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation.							
			<b>Total:</b>	<b>45 Hours</b>			
<b>Course Outcomes:</b>							
		After completion of the course, Student will be able to					
		1. Understand the characteristics of different types of solid and hazardous wastes and the factors affecting variation					
		2. Define and explain important concepts in the field of solid waste management and suggest suitable technical solutions for treatment of municipal and industrial waste					
		3. Understand the role legislation and policy drivers play in stakeholders' response to the waste and apply the basic scientific principles for solving practical waste management challenges					
<b>References:</b>							
1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, “Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.							
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.							
3. CPHEEO, “Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2000.							
4. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.							
5. Paul T Williams, Waste Treatment and Disposal, Wiley, 2005							

PEC	AIR POLLUTION MONITORING AND CONTROL			L	T	P	C
2103EV004				3	0	0	3
<b>Course Objectives:</b>							
	To impart knowledge on the principles and design of control of indoor/particulate/gaseous air pollutant and its emerging trends						
<b>Module I</b>	<b>Introduction</b>			<b>7 Hours</b>			
Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories – Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants.							
<b>Module II</b>	<b>Air Pollution Modeling</b>			<b>5 Hours</b>			
Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Transport & Dispersion of Air Pollutants – Modeling Techniques - Air Pollution Climatology.							
<b>Module III</b>	<b>Control Of Particulate Contaminants</b>			<b>11 Hours</b>			
Factors affecting Selection of Control Equipment – Gas Particle Interaction, – Working principle, Design and performance equations of Gravity Separators (cyclone) , Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations - Process Control and Monitoring – Costing of APC equipment – Case studies for stationary and mobile sources.							
<b>Module IV</b>	<b>Control of Gaseous Contaminants</b>			<b>11 Hours</b>			
Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations - Costing of APC Equipment – Case studies for stationary and mobile sources.							
<b>Module V</b>	<b>Indoor Air Quality Management</b>			<b>11 Hours</b>			
Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control – Membrane process - UV photolysis – Internal Combustion Engines - Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.							
			<b>Total:</b>	<b>45 Hours</b>			
<b>Course Outcomes:</b>							
	After completion of the course, Student will be able to						
	1. Apply sampling techniques						
	2. Apply modeling techniques						
	3. Suggest suitable air pollution prevention equipment’s and techniques for various gaseous and particulate pollutants to Industries. Discuss the emission standards						
<b>References:</b>							
1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.							
2. Noel de Nevers, Air Pollution Control Engg., McGraw Hill, New York, 1995.							
3. David H.F. Liu, Bela G. Liptak „Air Pollution“, Lweis Publishers, 2000.							
4. Anjaneyulu. Y, „Air Pollution & Control Technologies“ Allied Publishers (P) Ltd., India, 2002.							
5. Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)“, Academic Press, 2006.							
6. Wayne T.Davis, „Air Pollution Engineering Manual“, John Wiley & Sons,Inc.,2000.							
7. Daniel Vallero“ Fundamentals of Air Pollution”, Fourth Edition,2008.							

<b>PCC</b>	<b>MODULE OPERATIONS AND PROCESSES LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>2102EV203</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	
<b>Course Objectives:</b>						
	1. To develop the skill for conducting Treatability studies of water and wastewater treatment by various Module Operations and Processes using laboratory scale models.					
	2. To develop the skill for conducting Treatability studies of water and wastewater treatment by various Module Operations and Processes using laboratory scale models.					
<b>List of Experiments:</b>						
1. Coagulation and Flocculation						
2. Batch studies on settling						
3. Studies on Filtration- Characteristics of Filter media						
4. Water softening						
5. Adsorption studies/Kinetics						
6. Reverse Osmosis- Silt Density Index						
7. Kinetics of suspended growth process(activated sludge process)-Sludge volume Index						
8. Anaerobic Reactor systems / kinetics (Demonstration)						
9. Advanced Oxidation Processes – (Ozonation, Photocatalysis)						
10. Disinfection for Drinking water						
					<b>Total:</b>	<b>45 Hours</b>
<b>Course Outcomes:</b>						
er completion of the course, Student will be able to						
1. Conduct treatability studies for water and waste water treatment.						
2. Design laboratory models for various Module operations and processes.						
<b>References:</b>						
1. Metcalf and Eddy. Inc. „Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.						
2. Lee, C.C. and Shun dar Lin. Handbook of Environmental Engineering Calculations, McGraw Hill, New York, 1999.						
3. Casey T.J., Module Treatment Processes in Water and Wastewater Engineering, John Wileys Sons, London, 1993.						
4. David W.Hendricks, „Water Treatment Module Processes: Physical and Chemical“, CRC Press, Boca Raton, 2006.						

EEC	MINI PROJECT WITH SEMINAR			L	T	P	C
2104EV204				0	0	4	2
<b>Course Objectives</b>							
	To prepare students to identify a problem for study.						
	To do literature review of a problem.						
	To enable to comprehend information in form of presentation both written and oral to develop technical communication skills.						
	To carry out modelling/conduct experiments beyond regular laboratory exercises in developing solution to the identified problem.						
	To cultivate spirit of team work in working as a group.						
	A group of 2 students have to choose a problem and carry out scientific systematic investigate on experimentally/ theoretically in suggesting a viable solution. At the end of the semester, each group of students have to submit are port for evaluation.						
	<b>TOTAL :</b>			<b>30 PERIODS</b>			
<b>Course Outcomes:</b>							
	Students at the end of course will be						
	1. To critic all you serve the world around and identify a problem that can be solved.						
	2. To develop skills of read and comprehensively analyzing the facts.						
	3. To exhibit skill of presentation both or all y and in written form.						
	4. To get experience to doing experimental the critical analysis in synthesis of solution to the problem						
	5. Able to appreciate the importance of team work						

### 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 Common MODULE by 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. Nishitha Rai, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “”New Royal book Company, 2007.								
3. Sahni, Pardeep Et. Al. ,” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, 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						
1. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication						
2. "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 judgements							
<b>MODULE II</b>				<b>8 Hours</b>			
Importanceofcultivationofvalues.Senseofduty.Devotion,Self-reliance.Confidence,Concentration.Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, Nationaly 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 labour. 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
				2	0	0	0
<b>COURSE OBJECTIVES:</b>							
	1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective						
	2. To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional						
	3. Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.						
	4. To address the role of socialism in India after the commencement of theBolshevik Revolutionin1917and its impact on the initial drafting of the IndianConstitution.						
<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, May or and role of Elected Representative, CEO, Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: 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 there 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 PEDAGOGICAL 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 commMODULEy - 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, HardmanF (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. ChavanM(2003) Read India: Amass 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>
YamandNiyam-Do`sandDon`tinlife-i)Ahinsa,satya,astheya,bramhacharyaandaparigraha,							
<b>MODULE III</b>							<b>10 Hours</b>
Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization ofbreathing 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 Tarining-Part-I”:Janardan Swami Yoga bhyasiMandal,Nagpur							
2. Rajayoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama (PublicationDepartment), 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 (don't's)-Verses-71,73,75,78 (do's)						
<b>MODULE II</b>					<b>10 Hours</b>	
Approach to day to day work and duties - ShrimadBhagwadGeeta: 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 - ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 - Personality of role model - shrimadbhagwadgeeta - 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>							
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.							
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.							
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							
<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>							