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. POWER ELECTRONICS AND DRIVES

REGULATION -2021

First Year – Second Semester

Course Category	Course Code	Course Name	L	T	P	C	Maximum Marks		
							CA	ES	Total
Theory Course									
PCC	2102PE201	Solid State DC Drives	3	0	0	3	40	60	100
PCC	2102PE202	Solid State AC Drives	3	0	0	3	40	60	100
PEC	2103PE011	Program Elective – III(Special Machines and Their Controllers)	3	0	0	3	40	60	100
PEC	2103PE015	Program Elective – IV(Electric Vehicles and Power Management)	3	0	0	3	40	60	100
RMC	2101RMX01	Research Methodology and IPR	3	0	0	3	40	60	100
AC		Audit Course - II	2	0	0	0	100	00	100
Laboratory Course									
PCC	2102PE203	Digital Control of Power Electronic Circuits Laboratory	0	0	4	2	50	50	100
PCC	2102PE204	Electrical Drives Laboratory	0	0	4	2	50	50	100
EEC	2104PE205	Mini Project with Seminar	0	0	4	2	50	50	100
Total			**17**	**0**	**12**	**21**	**450**	**450**	**900**

2102PE201	SOLID STATE DC DRIVES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To understand the fundamentals of DC Drives.
2. To analyze the various control techniques for DC drives.
3. To determine the performance parameters of DC drives.

UNIT I	DC MOTOR FUNDAMENTALS AND MECHANICAL SYSTEMS	9 Hours

DC motor- Types, back emf, speed-torque relations; Speed control - Armature control, field control, Ward Leonard control; Constant torque and constant horse power operation; Introduction to high speed drives and modern drives; Characteristics of mechanical system - Dynamic equations, components of torque, types of load; Requirements of drive characteristics; Stability of drives; Multi-quadrant operation; Motor duty and selection of motor ratings.

UNIT II	CONVERTER CONTROL	9 Hours

Principle of phase control - Fundamental relations; Analysis of series and separately excited DC motor with single-phase and three-phase converters - Waveforms, performance characteristics, continuous and discontinuous armature current operations; Current ripple and its effect on performance; Operation with freewheeling diode; Implementation of braking schemes; Dual converter drive.

UNIT III	CHOPPER CONTROL	9 Hours

Time ratio control and frequency modulation; Chopper controlled DC motor drives - Class A, B, C, D and E, performance analysis, multi-quadrant control; Chopper based implementation of braking schemes; Multi-phase chopper.

UNIT IV	CLOSED LOOP CONTROL	9 Hours

Modeling of drive elements - Equivalent circuit, transfer function of self and separately excited DC motors; Linear Transfer function model of power converters; Sensing and feedback elements; closed loop speed control - Current and speed loops; P, PI and PID controllers – response comparison; Simulation of converter and chopper fed dc drive.

UNIT V	DIGITAL CONTROL OF DC DRIVE	9 Hours

Phase locked loop and micro-computer control of DC drives - Program flow chart for constant horse power and load disturbed operations; Speed detection and current sensing circuits.

TOTAL: 45 HOURS

REFERENCES:

1. Gopal K Dubey, “Power Semiconductor controlled Drives”, Prentice Hall Inc., New Jersey, 1989.
2. R.Krishnan, “Electric Motor Drives – Modeling, Analysis and Control”, Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.
3. Gobal K.Dubey, “Fundamentals of Electrical Drives”, Narosa Publishing House, New Delhi, Second Edition, 2009
4. Vedam Subramanyam, “Electric Drives – Concepts and Applications”, Tata McGraw-Hill publishing company Ltd., New Delhi, 2002.
5. P.C Sen “Thyristor DC Drives”, John wiely & Sons, New York, 1981.

2102PE202	SOLID STATE AC DRIVES	L	T	P	C
		3	0	0	3

Course Objectives:

1. To understand the fundamentals of AC Drives.
2. To analyze the various control techniques for AC drives.
3. To determine the performance parameters of AC drives.

UNIT I **INTRODUCTION TO INDUCTION MOTORS** **9 Hours**

Steady state performance equations; Rotating magnetic field, torque production, equivalent circuit; Variable voltage, constant frequency operation, variable frequency operation, constant volt/Hz operation; Drive operating regions; Variable stator current operation; Braking methods.

UNIT II **STATOR CONTROLLED INDUCTION MOTOR DRIVES** **9 Hours**

Principles of speed control - Variable voltage, variable frequency, constant flux and constant power operation; Speed control of VSI and CSI fed drives; Closed loop control schemes; Braking methods; Speed reversal.

UNIT III **ROTOR CONTROLLED INDUCTION MOTOR DRIVES** **9 Hours**

Torque slip characteristics; Speed control - Rotor resistance control, chopper controlled resistance, TRC strategy; Combined stator voltage and rotor resistance control; Closed loop control scheme; Slip power recovery schemes - Sub and super synchronous operations.

UNIT IV **FIELD ORIENTED CONTROL** **9 Hours**

Field oriented control of induction machines - Theory, DC drive analogy, direct and indirect methods, Flux vector estimation; Direct torque control of induction machines – Torque expression with stator and rotor fluxes, DTC control strategy.

UNIT V **SYNCHRONOUS MOTOR DRIVES** **9 Hours**

Need for leading PF operation; Open loop VSI fed drive; Group drive applications; Self-control, margin angle control, torque angle control and power factor control - Simple design examples; Closed loop speed control scheme with various power controllers; Starting methods; Brushless excitation systems.

TOTAL: 45 HOURS

REFERENCES:

1. Bimal K Bose, “Modern Power Electronics and AC Drives”, Pearson Education Asia 2002.
2. Vedam Subramanyam, “Electric Drives – Concepts and Applications”, Tata McGraw Hill, 1994.
3. Gopal K Dubey, “Power Semiconductor controlled Drives”, Prentice Hall Inc., New Jersey, 1989.
4. R.Krishnan, “Electric Motor Drives – Modeling, Analysis and Control”, Prentice-Hall of India Pvt. Ltd., New Delhi, 2003
5. W.Leonhard, “Control of Electrical Drives”, Narosa Publishing House, 1992.
6. Murphy J.M.D and Turnbull, “Thyristor Control of AC Motors”, Pergamon Press, Oxford, 1988.

2101RMX01	RESEARCH METHODOLOGY AND IPR	L	T	P	C
		3	0	0	3

MODULE I	RESEARCH PROBLEM FORMULATION	9 Hours

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.

MODULE II	LITERATURE REVIEW	7 Hours

Effective literature studies approaches, analysis, plagiarism, and research ethics.

MODULE III	TECHNICAL WRITING /PRESENTATION	9 Hours

Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.

MODULE IV	INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR)	9 Hours

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.

MODULE V	INTELLECTUAL PROPERTY RIGHTS (IPR)	11 Hours

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.

	TOTAL: 45 HOURS
• Seminar presentation can be given in this subject	

REFERENCES:

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, “Research Methodology: A Step by Step Guide for beginners” , 2nd Edition, 2010.

2102PE203	DIGITAL CONTROL OF POWER ELECTRONIC CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS:

1. Generation of PWM signals using 8 bit microcontroller for a single phase half controlled converter.
2. Generation of PWM signals using 8 bit microcontroller for a single phase fully controlled converter.
3. Generation of PWM signals using 8 bit microcontroller for a single phase H- bridge inverter.
4. Generation of PWM signals using 8 bit microcontroller for a three phase inverter.
5. Generation of PWM signals using 8 bit microcontroller for a step up and step down chopper.
6. FPGA based PWM generation for an H- bridge inverter.
7. FPGA based PWM generation for a three phase inverter.
8. FPGA based PWM generation for a step up and step down chopper.
9. FPGA based PWM generation for a cycloconverter.
10. FPGA based PWM generation for a simple multi-level inverter.

TOTAL: 60 HOURS

REFERENCES:

1. Ned Mohan, T.M. Undeland and W.P Robbin, “Power Electronics: converters, Application and design” , John Wiley & Sons. Wiley India Edition, 2006.
2. Rashid M.H., “Power Electronics Circuits, Devices and Applications ", Prentice Hal India, New Delhi, 1995.
3. https://www.fpga4student.com/2017/06/pwm-generator-in-vhdl.html
4. https://vhdlwhiz.com/pwm-controller/

2102PE204	ELECTRICAL DRIVES LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS:

1. Speed control of converter fed DC motor.
2. Speed control of chopper fed DC motor.
3. V/f control of three-phase induction motor.
4. Micro controller based speed control of stepper motor.
5. Speed control of BLDC motor.
6. DSP based speed control of SRM motor.
7. Design of switched mode power supplies.
8. Design of UPS.
9. Simulation of four quadrant operation of three-phase induction motor.
10. Voltage regulation of three-phase synchronous generator.

TOTAL: 60 HOURS

REFERENCES:

1. Ned Mohan, T.M. Undeland and W.P Robbin, “Power Electronics: converters, Application and design” , John Wiley & Sons. Wiley India Edition, 2006.
2. Rashid M.H., “Power Electronics Circuits, Devices and Applications ", Prentice Hal India, New Delhi, 1995.

2104PE205	MINI PROJECT WITH SEMINAR	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- 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 modeling/ conduct experiments beyond regular laboratory exercises in developing solution to the identified problem.
- To cultivate spirit of team work in working as a group.

Each student has to choose a problem and carry out scientific systematic investigation experimentally/ theoretically in suggesting a viable solution. At the end of the semester, each student has to submit a report for evaluation. Seminar presentations need to be given by the student.

TOTAL: 30 HOURS

OUTCOMES

Students at the end of course will be

- To critically observe the world around and identify a problem that can be solved.
- To develop skills of read and comprehensively analyzing the facts.
- To exhibit skill of presentation both orally and in written form.
- To get hands on experience to doing experimental/ theoretical analysis in synthesis of solution to the problem

2103PE011	SPECIAL MACHINES AND THEIR CONTROLLERS	L	T	P	C
		3	0	0	3

MODULE I	STEPPER MOTORS	9 Hours

Types - Constructional features, principle of operation, modes of excitation - torque production in Variable Reluctance (VR) stepper motor, dynamic characteristics, Drive systems and circuit for open loop and closed loop control of stepper motor.

MODULE II	SWITCHED RELUCTANCE MOTORS	9 Hours

Constructional features, principle of operation, Torque equation, characteristics, Control Techniques, Drive concept – Applications- Introduction to SynRM.

MODULE III	PERMANENT MAGNET BRUSHLESS DC MOTORS	9 Hours

Commutation in DC motor, Electronic commutation, Hal sensors, Optical sensors, Magnetic circuit model, Multiphase Brushless motor, Square wave permanent magnet brushless motor drives, Torque and emf equation, Torque-speed characteristics, Controllers - Microprocessor based controller.

MODULE IV	PERMANENT MAGNET SYNCHRONOUS MOTORS	9 Hours

Introduction -Motor Morphologies -Principle of operation, EMF, power input and torque expressions, Phasor diagram, Torque -speed characteristics -Parameter Estimation Power controllers, Torque Controllers, Self-control, Vector control, Current control schemes.

MODULE V	LINEAR AND SERVO MOTORS	9 Hours

Linear Induction motor (LIM) classification - construction - Principle of operation - concept of current sheet - goodness factor - DC Linear Motor (DCLM) types - circuit equation - DCLM control applications. Servomotors: Types – Constructional features, principle of operation - control applications .

TOTAL: 45 HOURS

REFERENCES:

1. Miller T.J.E, “Brushless Permanent Magnet and Reluctance Motor Drives”, Clarendon Press, Oxford, 1989.
2. KenjoT and Naganori, S., “Permanent Magnet and Brushless DC Motors”, Clarendon Press, Oxford, 1989.
3. Kenjo T, “Stepping Motors and their Microprocessor Control”, Clarendon Press, Oxford, 1989.
4. Naser A and Boldea I., “Linear Electric Motors: Theory, Design and Practical Applications”, Prentice Hall Inc., New Jersey, 1987.
5. Floyd E Saner, “Servo Motor Applications”, Pittman USA, 1993.

2103PE015	ELECTRIC VEHICLES AND POWER MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I	ELECTRIC VEHICLES AND VEHICLE MECHANICS	9 Hours

Electric Vehicles (EV), Hybrid Electric Vehicles (HEV), Engine ratings, Comparisons of EV with internal combustion engine vehicles, Fundamentals of vehicle mechanics.

MODULE II	ARCHITECTURE OF EV'S AND POWER TRAIN COMPONENTS	9 Hours

Architecture of EV's and HEV's - Plug-in Hybrid Electric Vehicles (PHEV); Power train components and sizing, Gears, Clutches, Transmission and Brakes.

MODULE III	CONTROL OF DC AND AC DRIVES	9 Hours

DC/DC chopper based four quadrant operations of DC drives – Inverter based V/f Operation (motoring and braking) of induction motor drive system; Induction motor and permanent motor based vector control operation; Switched reluctance motor (SRM) drives.

MODULE IV	BATTERY ENERGY STORAGE SYSTEM	9 Hours

Battery basics, Different types, Battery parameters, Battery modeling, Traction Batteries.

MODULE V	ALTERNATIVE ENERGY STORAGE SYSTEMS	9 Hours

Fuel cell – Characteristics, types, hydrogen storage systems and fuel cell EV; Ultra capacitors.

TOTAL: 45 HOURS

REFERENCES:

1. Iqbal Hussain, "Electric and Hybrid Vehicles: Design Fundamentals", CRC Press, Taylor & Francis Group, Second Edition, 2011.

2. Ali Emadi, Mehrdad Ehsani, John M.Miller, "Vehicular Electric Power Systems", Special Indian Edition, Marcel dekker, Inc 2010.

AUDIT COURSES

2101AU001	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

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

MODULE I	**INTRODUCTION TO RESEARCH PAPER WRITING**	**6 Hours**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

MODULE II	**PRESENTATION SKILLS**	**6 Hours**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

MODULE III	**TITLE WRITING SKILLS**	**6 Hours**

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

MODULE IV	**RESULT WRITING SKILLS**	**6 Hours**

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

MODULE V	**VERIFICATION SKILLS**	**6 Hours**

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

Total:	**30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

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

REFERENCES:

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

Course Objectives:

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

MODULE I	INTRODUCTION	6 Hours

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude

MODULE II	REPERCUSSIONS OF DISASTERS AND HAZARDS	6 Hours

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 III	DISASTER PRONE AREAS IN INDIA	6 Hours

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 IV	DISASTER PREPAREDNESS AND MANAGEMENT	6 Hours

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.

MODULE V	RISK ASSESSMENT	6 Hours

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

	Total:	30 Hours

FURTHER READING: -

COURSE OUTCOMES:

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

REFERENCES:

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

COURSE OBJECTIVES:	
	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.

MODULE I	ALPHABETS	6 Hours
Alphabets in Sanskrit		
MODULE II	**TENSES AND SENTENCES**	**6 Hours**
Past/Present/Future Tense - Simple Sentences		
MODULE III	**ORDER AND ROOTS**	**6 Hours**
Order - Introduction of roots		
MODULE IV	**SANSKRIT LITERATURE**	**6 Hours**
Technical information about Sanskrit Literature		
MODULE V	**TECHNICAL CONCEPTS OF ENGINEERING**	**6 Hours**
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics		
	Total:	**30 Hours**

FURTHER READING:	-

COURSE OUTCOMES:	
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

REFERENCES:

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi

1. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya SanskritSansthanam, 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

COURSE OBJECTIVES:

1. Understand value of education and self-development
2. Imbibe good values in students
3. Let the should know about the importance of character

MODULE I **6 Hours**

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

MODULE II **8 Hours**

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, Nationaly Patriotism. Love for nature, Discipline

MODULE III **8 Hours**

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

MODULE IV **8 Hours**

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.

Total: **30 Hours**

FURTHER READING: -

COURSE OUTCOMES:

CO1	Knowledge of self-development
CO2	Learn the importance of Human values
CO3	Developing the overall personality.

REFERENCES:

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

COURSE OBJECTIVES:	
	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 the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

MODULE I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION:	5 Hours
History, Drafting Committee, (Composition & Working)		
MODULE II	**PHILOSOPHY OF THE INDIAN CONSTITUTION:**	**5 Hours**
Preamble, Salient Features		
MODULE III	**CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES:**	**5 Hours**
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 IV	**ORGANS OF GOVERNANCE:**	**5 Hours**
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 V	**LOCAL ADMINISTRATION:**	**5 Hours**
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.		
MODULE VI	**ELECTION COMMISSION:**	**5 Hours**
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.		
	Total:	**30 Hours**

FURTHER READING:	-
COURSE OUTCOMES:	
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 thatinformed 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.

REFERENCES:

1. The Constitution of India,1950 (Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th 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

COURSE OBJECTIVES:

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.

MODULE I	INTRODUCTION AND METHODOLOGY	6 Hours

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 II	THEMATIC OVERVIEW	6 Hours

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

MODULE III	EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES	6 Hours

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 IV	PROFESSIONAL DEVELOPMENT	6 Hours

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

MODULE V	RESEARCH GAPS AND FUTURE DIRECTIONS	6 Hours

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

	Total:	30 Hours

FURTHER READING: -

COURSE OUTCOMES:

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?

REFERENCES:

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. Chavan M(2003) Read India: Amass scale, rapid, „learning to read‟ campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf

2101AU007	STRESS MANAGEMENT BY YOGA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:	
	1. To achieve overall health of body and mind
	2. To overcome stress

MODULE I		10 Hours
Eight parts of yoga.(Ashtanga)		
MODULE II		**10 Hours**
Yam and Niyam - Do`s and Don"t's in life - i) Ahinsa, satya, astheya, bramhacharya and aparigraha,		
MODULE III		**10 Hours**
Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization ofbreathing techniques and its effects-Types of pranayam		
	Total:	**30 Hours**

FURTHER READING:	-
COURSE OUTCOMES:	
CO1	Develop healthy mind in a healthy body thus improving social health also
CO2	Improve efficiency

REFERENCES:

1. Yogic Asanas for Group Tarining-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

Course Objectives:	
	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

MODULE I	**10 Hours**
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 (d0˝s)	
MODULE II	**10 Hours**
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.	
MODULE III	**10 Hours**
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	
Total:	**30 Hours**

FURTHER READING:	-
COURSE OUTCOMES:	
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.

REFERENCES:

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

COURSE OBJECTIVES:

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

MODULE 1 **10 Hours**

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.

MODULE 2 **10 Hours**

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).

MODULE 3 **10 Hours**

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.

Total: **30 Hours**

REFERENCES:

1. https://www.rcisgbau.in/pdf/UBA_concept_note.pdf
2. https://unnatbharatabhiyan.gov.in/documents
3. https://unnatbharatabhiyan.gov.in:8443/introduction
4. https://unnatbharatabhiyan.gov.in:8443/new-website/https://unnatbharatabhiyan.gov.in:8443/app/webroot/files/general-documents/Unnat%20Bharat%20Abhiyan-%20Brochure%202016.pdf