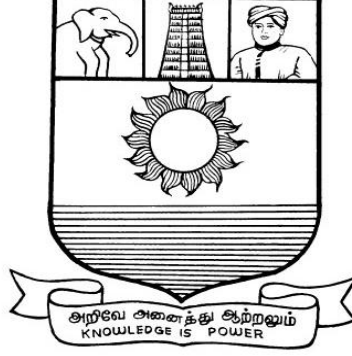


மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
திருநெல்வேலி – 627 012

**Manonmaniam Sundaranar University
Thirunelveli – 627 012.**



கல்விசார் நிலைக்குழுக் கூட்டம்

**MEETING OF THE STANDING COMMITTEE ON
ACADEMIC AFFAIRS HELD ON FRIDAY
THE 27th OCTOBER 2017.**

**Syllabus for Diploma in Renewable Energy – Solar Systems & Training
Course offered through Directorate of Vocational Education
(Community Colleges and Extension Learning Programme)
from 2017 – 2018**

DIPLOMA IN RENEWABLE ENERGY-SOLAR (PHOTOVOLTAICS) SYSTEMS AND TRAINING
SCHEME OF EXAMINATIONS

Subject Code	Title of the Papers	Credit	Hours	Passin Minimum
Semester I				
C17SS11/E17SS01	Renewable and Non-renewable energies	6	90	40/100
C17SS12/E17SS02	Electrical and Electronic Principles	6	90	40/100
C17SS13/E17SS03	Solar Energy Generation and utilization	6	90	40/100
C17CE10/E17CE10	Communicative English	6	90	40/100
C17SSP1/E17SSP1	Electrical and Electronic Principles – Practical knowledge of Electrical & Electronic components - I	4	60	40/100
Semester II				
C17SS21/E17SS05	Entrepreneurship and small business	6	90	40/100
C17SSP2/E17SSP2	Electrical and Electronic Principles – Practical knowledge of Electrical & Electronic components - II	4	60	40/100
C17LS23/E17LS05	Life skills	6	90	40/100
C17SSP3/E17SSP3	Solar energy generation and utilization solar system – Installing & Servicing	4	60	40/100
C17SSPW/E17SSPW	Project & Field Trip	12	180	40/100

Eligibility for admission: Pass in 12thstd examination conducted by the Govt. of Tamil Nadu Board of Secondary Education, Government of Tamil Nadu or any other equivalent examination.

Examination: Passing Minimum for each paper is 40%. Classification will be done on the basis percentage marks of the total marks obtained in all the papers and as given below:

40 % but less than 50 %	- Third class
50 % but less than 60 %	- Second class
60 % and above	- First class

Syllabus

First Semester

Paper-I : Renewable and non renewable energies
 Paper-II : Electrical and electronic principles
 Paper-III : Solar energy generation and utilization
 Paper-IV : Communicative English
 Paper-V : Electrical and electronic principles - Practical Knowledge of Electrical & Electronic components

Second Semester

Paper-VI : Entrepreneurship and small business
 Paper-VII : Electrical and electronic principles -Practical Knowledge of Electrical & Electronic components
 Paper-VIII : Life Skill
 Paper -IX : Solar energy generation and utilization Solar system Installing
 Paper -X : Project & Field Trip & Servicing

***(Semester Pattern for Community College Only)**

(C17SS11/E17SS01) PAPER – I RENEWABLE AND NON RENEWABLE ENERGIES

UNIT-I Energy – Form of energy – Energy need – availability of energy – Natural energy sources –

UNIT-II Conventional Energy sources – petroleum – Natural Gas – Coal and Lignite – scarcity of natural energy source – Raise in demand of energy and fuel

UNIT-III Alternate energy – renewable energy – Merits and demerits of renewable energy – Renewable energy sources – Wind – Ocean tide and wave – Solar – bio gas – geo thermal

UNIT-IV Wind energy: Potential and Availability - Characteristics of Wind, Estimation and Measurement - Wind Machines - Uses and Applications, Limitations Wave Energy: Tidal, OTEC: Basic Principle & Systems- Applications and Limitations. – Aerodynamics – season and location – Mechanical conversion – power generation – water pumping – bio gas – generation – utilization – large scale plants – power generation using Tide and wave – geo thermal power plants.

UNIT-V Sun Solar Radiation, Earth Sun Relationship (Angles and Models, Earth and Sun Relation), Measurement, Solar Cookers, Solar Collectors, Flat Plate Collectors for Water, Flat Plate Collectors for Air, Concentrating Collectors – energy form – heat and light – energy from sun – solar cycle – Heating effect – Solar water heater – solar cooker – Room heater – Power generation.

Text Book :

- 1) Non- Conventional Energy Sources; G D Rai, Published by Khanna Publishers, New Delhi
- 2) Renewable Energy Engineering & Technology – A Knowledge compendium Edited by V V N Kishore; Published by TERI Press, New Delhi
- 3) Fundamental of Renewable Energy Sources; G N Tewari & M K Ghosal, Published by Narora Publishing House, New Delhi
4. Geothermal Energy, Dickson
5. Wind Energy Conversation Systems, Fneris L.L.
6. Renewable Energy, Thomas B, Johansson
7. Solar Energy; Principal of Thermal Collection & Storage, Sukhatme, S.P.

(C17SS12/E17SS02) PAPER – II ELECTRICAL AND ELECTRONIC PRINCIPLES

UNIT-I Electron theory - flow of electron - current flow and direction - potential difference - Current - voltage - power - basic units - AC - DC - power supplies - frequency - frequency standerds in power supply.

UNIT-II DC power supply - source of DC power - Chemical cell - battery - battery array - Types of batteries - electrical parameters of battries - Alternate DC power supplies - DC generators - Rectifiers - battery cahargers - maintainance.

UNIT-III AC power supply - need for AC supply - Source of AC power supply - Conversion from AC to DC - AC supply frequency and wave form - Sine wave, Square wave, modified sine wave, DSP wave forms - Conversion of DC to AC

UNIT-IV Resistance - Capacitance - Inductance - Transformer - step Up and step down transformers - Tools and Instruments - Measuring tools - Ammeter, volt meter, Ohm meter, watt meter wathour meter.

UNIT-V Type of load - resistive load- inductive load - Calculating total load - Estimating current rating - ampere calculation - power factor - VA vs WATT - Power Supply planning - protective methods

Text book :

- Basic Electronics – B.L Theraja
- Basic Electrical – B.L. Theraja

(C17SS13/E17SS03)PAPER – III SOLAR ENERGY GENERATION AND UTILIZATION

UNIT-I Material classification according to electrical behaviour - Semiconductor - Crystal - photo characteristics of semiconductors - Photovoltaic effect.

UNIT-II Photovoltaic cells - mono crystal - poly crystal - other types of cells - comparison between cell types - Selecting suitable photovoltaic cell - photovoltaic panels - Preparation of panels - Rating of panels

UNIT-III Inverters - inverter working principle - hybrid inverters - inverter rating - Selecting proper inverter rating - Working voltage of inverter - Sine wave, Square wave, modified sine wave, DSP wave form inverters

UNIT-IV Installation of solar panels - selecting location - calculating power level - method of arrangements of panel - angle of incline - snow load test - other mechanical ratings - Trouble shooting – maintenance

UNIT-V Additional equipments - independent chargers - PWM and MPPT chargers - Cascading solar panels - cascading batteries - battery Equalizers - Grid tie Inverters - Precautions in installing panels and inverters.

Text books:

- 1) Solar Cells: Operating Principles, Technology and System Applications, Martin Green Published by the University of New South Wales, 1980 (Required) available at the BU Barnes and Noble book store
- 2) Solar Engineering of Thermal Processes, Third Edition, John A. Duffie and William A. Beckman, John Wiley and Sons. Inc. 2005 (Chapters 1, 2,3, and 7) Recommended
- 3) www.pveducation.org

Reference Books:

- 1) Photovoltaic Science and Engineering Handbook, Second Edition, Antonio Luque and Steven Hegedus, John Wiley and Sons, 2012
- 2) Thin film Solar Cells, Jeff Poortmans and Vladimir Arkhipov (Ed) John Wiley and Sons Ltd. 2006
- 3) Solar Cell Device Physics, Second Edition, Stephen J. Fonash, Elsevier, Inc., 2010
- 4) Solar Electricity, Second Edition, Thomas Markvart (Editor), John Wiley and Sons, Ltd., 2000,
- 5) Photovoltaic Engineering Handbook, F. Lasnier and T. G. Ang, IOP Publishing UK

(C17CE10/E17CE10) Paper IV Communicative English

Unit I: Learning context

Concept of learning – Learning style –Grammatical framework – sentence framing – paragraph and texts

Unit II: Reading

Basic concept – Purposes of reading-Decoding-Reading materials – Barriers of reading

Unit III: Writing

Basic concept-Writing style-Terminology-stages-English spelling and punctuation – Written texts

Unit IV: Speaking

Language functions-Conversation- Features of spoken English – Types of English course: functional English, English literature, advance English – Phonetic

Unit V: Developing Communication Skills

Meaning –Classroom presence- Features of developing learning process- Practical skills and Listening- uses of communicative English

References

1. Raman, m.&S. Sharma (2011) communication skills, OUP,New Delhi: India
2. Lata, P.&S. Kumar(2011) communication skills, OUP,New Delhi: India,
- 3.Leech,G&J.Svartvik(2002) A communicative grammar of English, Pearson,India,
4. Sethi, J. and P.V. Dharmija (2007) A course in Phonetics and spoken English. Second edition, Prentice hall: New Delhi

(C17SSP1/E17SSP1) PAPER V- PRACTICAL I

Electrical and electronic principles - Practical Knowledge of Electrical & Electronic components

(C17SS21/E17SS05) PAPER – VI ENTREPRENEURSHIP AND SMALL BUSINESS

UNIT-I Er.-Entrepreneurship-Enterprise: Conceptual issues. Entrepreneurship vs. Management. Roles and functions of er in relation to the enterprise and in relation to the economy. Entrepreneurship is an interactive process between the individual and the environment. Small business as seedbed of Entrepreneurship. [The teachers should emphasize to students the desirability as well as feasibility of a career in Entrepreneurship in the Indian scenario.] Entrepreneur competencies, Entrepreneur motivation, performance and rewards.[The teachers may make use of Entrepreneurship Development Institute of India's Inventory of Entrepreneur Competencies and National Institute of Entrepreneurship and Small Business Developments training kit for arousing Entrepreneur motivation and capacity and capability building].

UNIT-II Opportunity scouting and idea generation: role of creativity and innovation and business research. Sources of business ideas. Entrepreneur opportunities in contemporary business environment, for example opportunities in net-work marketing, franchising, business process outsourcing in the early 21 century.[The students be advised to visit various product/service franchises, BPO concerns and meet up/down links in the net-work marketing.] The process of setting up a small business: Preliminary screening and aspects of the detailed study of the feasibility of the business idea and financing/non-financing support agencies to familiarize themselves with the policies/programs and procedures and the available schemes.] Preparation of Project Report and Report on Experiential Learning of successful and unsuccessful entrepreneurs. [The students may be advised to develop a structured instrument [questionnaire] for conducting surveys of the various aspects of entrepreneur/enterprise. They may also be advised to prepare a comprehensive business plan. The desirability and feasibility of liaison with relevant funding and non-funding agencies may also be explored.

UNIT-III Management roles and functions in a small business. Designing and re-designing business process, location, layout, operations planning and control. Basic awareness on the issues impinging on quality, productivity and environment. Managing business growth. [The pros and cons of alternative growth options: internal expansion, acquisitions and mergers, integration and diversification. Crisis in business growth.

UNIT-IV Principles of double-entry book-keeping: journal entries, cash-book, pass book, and Bank Reconciliation Statement, ledger accounts, trail balance and preparation of final accounts: Trading and Profit and Loss Account; Balance-sheet. Brief introduction to Single-Entry system of record keeping. Sources of risk/venture capital, fixed capital, working capital and a basic awareness of financial services such as leasing and factoring.

UNIT-V Issues in small business marketing. The concept and application of product life cycle [plc], advertising and publicity, sales and distribution management. The idea of consortium marketing, competitive bidding/tender marketing, negotiating with principal customers. The contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development.

Reference books:

1. Brandt, Steven C., The 10 Commandments for Building a Growth Company, Third Edition, Macmillan Business Books, Delhi, 1977
2. Bhide, Amar V., The Origin and Evolution of New Business, Oxford University Press, New York, 2000.
3. Dollinger M.J., 'Entrepreneurship strategies and Resources', 3rd edition, Pearson Education, New Delhi 2006.
4. Desai, Vasant Dr. (2004) Management of small scale enterprises New Delhi: Himalaya Publishing House,
5. Taneja, Gupta, Entrepreneur Development New Venture Creation,,: 2nd ed. Galgotia Publishing Company
6. Holt, David H., Entrepreneurship: Strategies and Resources, Illinois, Irwin, 1955.
7. Panda, Shiba Charan, Entrepreneurship Development, New Delhi, Anmol Publications.
8. Patel, V.G., The Seven Business Crises and How to Beat Them, Tata-Mcgraw, New Delhi, 1995.
9. SIDBI Report n Small Scale Industries Sector[latest edition]
10. Verma, J.C., and Guralp Singh, Small Business and Industry-A Handbook for Entrepreneurs, Sage, New Delhi, 2002
11. Vesper, Karl H., New Venture Strategies, [Revised Edition], New Jersey, Prentice Hall, 1990

(C17SSP2/E17SSP2) PAPER VII- PRACTICAL I

Electrical and electronic principles - Practical Knowledge of Electrical & Electronic components

List of Practicals II: Electrical and Electronic Principles

(Any 10 practicals may be selected)

1. Verification Kirchoff's laws
2. Construction of 5 amps distribution box
3. Study of various wiring components: wires, fuses, sockets, plugs, lamps, indicators etc. - Their rating and uses
4. Wiring exercise – control of two lamps from two switches and staircase wiring
5. To study RLC circuit
6. To study the speed control D.C. shunt motor - armature voltage control method
7. Determination of VI characteristics of PN junction diode
8. Determination of VI characteristics of Zener diode
9. Determination of input/output characteristics of transistor
10. Determination of characteristics operational amplifier IC741
11. A simple circuit using IC 555
12. Construction of Power pack rectifier circuit
13. Construction of IC regulated power supply

(C17LS23/E17LS05) PAPER VIII (LIFE SKILL)

(Common to All Courses)

UNIT-I ATTITUDE : Positive thinking – Goal setting – Problem Solving and Decision making – Leadership and Team Work.

UNIT-II COMMUNICATION SKILLS: Oral communication: Concept of English language – Fluency – Verbal communication in official and public situations.

UNIT-III COMMUNICATION SKILLS: Written Communication: Comprehension – Writing a formal letter like application for Job, enquiry, reply, complaint and such others – preparation of Resume, Curriculum Vitae.

UNIT-IV COMPUTING SKILLS – 1: Introduction to Computers, its various components and their respective functions – Memory storage devices – Microsoft (MS) Office – MS Word.

UNIT-V COMPUTING SKILLS – 2 Internet Basics – Origin of Internet – MODEM – ISP – Upload – Download – e-mail – Origin of worldwide web (www) Browsers – Search engines.

Reference books:

Life skill, Manonmaniam Sundaranar University Publications Division (2011)

(C17SSP3/E17SSP3) PAPER IX- PRACTICAL II

Solar energy generation and utilization Solar system – Installing & Servicing

(C17SSPW/E17SSPW) PAPER X PROJECT & FIELD TRIP
