**CHALAPATHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**

CHALAPATHI NAGAR, LAM, GUNTUR

ANDHRA PRADESH-522034



**COURSE FILE**

Subject : New & Renewable Energy Sources (EE-415)

Class : IV/IV B.Tech, Ist Semester

Regulation : R-15

Prepared by

Mr.G. SATISH M.Tech

Assistant Professor

**DEPARTMENT OF**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**2019-20**



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**INSTITUTE VISION & MISSION**

**Vision**

To emerge as an Institute of Excellence for Engineering and Technology and provide world-class education and research opportunities to the students catering to the needs of society.

**Mission**

Establish a state-of-the-art Engineering Institute with continuously improving infrastructure and produce students with innovative skills and global outlook.

PRINCIPAL



**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**VISION & MISSION**

**Vision**

To produce professionally competent, research oriented and duty bounded technocrats towards the development of state of art products and technologies to meet the changing needs of the society.

**Mission**

**DM1:** Provide the domain expertise and state of art infrastructure.

**DM2**: Provide advanced application / research-oriented engineering laboratories, for Research and product development.

**DM3**: Offer a platform for industry orientation to become successful service-oriented technocrats.

HOD-EEE



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

|  |  |
| --- | --- |
| **PROGRAM OUTCOMES (PO's)** | |
| A graduate of the Electronics and Communication Engineering Program will demonstrate: | |
| **PO1:** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO2:** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences |
| **PO3:** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO4:** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO5:** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| **PO6:** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| **PO7:** | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO8:** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO9:** | **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO10:** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO11:** | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |
| **PO12:** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary  Environments. |

**HOD-EEE**



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**PROGRAM EDUCATIONAL OBJECTIVES (PEO’S)**

**PEO I**: Graduates shall experience success in electrical and electronics engineering areas and other diverse fields that require analytical and professional skills.

**PEO II**: Graduates shall contribute to their fields of profession and excel in professional ethics and leadership qualities.

**PEO III:** Graduates shall acquire effective communication skills and succeed in multidisciplinary fields.

**PEO IV**: Graduates shall continue to have advanced education and life-long learning.

**PROGRAM SPECIFIC OUTCOMES (PSO’S)**

* **PSO1:** Able to utilize the knowledge of high voltage engineering in collaboration with power systems in innovative, dynamic and challenging environment, for the research-based teamwork.
* **PSO2:** Can explore the scientific theories, ideas, methodologies and the new cutting-edge Technologies in Renewable Energy Resources, Power Electronics &amp; Drives and Hybrid Vehicles.
* **PSO3:** The understanding of technologies like PLC, PMC, Process Controllers, Transducers, HMI and IOT applications, one can analyze, design electrical and electronics principles to install, test, maintain power system and applications.

**HOD-EEE**

|  |  |
| --- | --- |
|  | **ACHARYANAGARJUNAUNIVERSITY**  **IV/IV B.TECH - I SEMESTER,**  **ELECTRICAL & ELECTRONICS ENGINEERING**  **COURSE STRUCTURE** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Course Details** | | **Scheme of Instruction** | | | **Scheme of Examination** | | | **Credits** |
| **Code No.** | **Subject Name** | **Periods per week** | | | **Maximum Marks** | | **Total Marks** |
| **L** | **T** | **P** | **Internal** | **External** |
| 1 | **EE 415** | **NEW AND RENEWABLE ENERGY SOURCES** | 4 | 0 | 0 | 40 | 60 | 100 | 4 |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**UNIVERSITY SYLLABUS**

**UNIT-I 8Hrs**

**Renewable Energy Technologies:**

Basic principles of Energy conversion: Heat Energy Conversion Principles – Mechanical Energy Principles – Solar Radiation Conversion: Photovoltaic Conversion – Photo Electro Chemical Conversion – Solar Thermal Conversion – Fuel Cells – Basic Principles of Hydrogen – Oxygen fuel cell – factors effecting the Power output – Maximum Power output -Bio Energy Conversion Process – Combustion and composting of Bio- Mass – Production of heat by bio-mass – Bio-logical Conversion into gaseous into liquid bio-fuels.

**UNIT-II 15Hrs**

**Introduction to Solar Cells:**

P-N Junction Under illumination: solar cell – generation of photo voltage – light generated current – I-V equation of solar cell – solar cell characteristics. Upper limits of cell parameters – short circuit current – open circuit voltage - Fill factor - efficiency –losses in solar cells – model of solar cell – effect of series and shunt Resistance on efficiency – effect solar radiation on efficiency -effect of temperature on efficiency – basic design aspects of solar cells.

**UNIT-III 15Hrs**

**Thin film solar cell technologies:**

Generic advantages of thin film technologies - materials for thin film technologies – thin film de position techniques – Common features of thin film technologies.

**Solar Photo Voltaic modules:**

Solar PV modules from solar cells – series and parallel connection of cells – mismatch in series and parallel connection. Design and structure of PV modules: number of solar cells in a module – wattage of modules – fabrication of PV modules. PV module power output- I-V equation of P.V modules – ratings of P.V modules- I-V and Power curves of module. DC – DC convertors used in Solar systems – maximum power point tracking algorithms.

**UNIT-IV 12Hrs**

**WIND ENERGY SYSTEMS:**

**Generation schemes with variable speed turbines:** classification of schemes – operating area –Induction Generators-Doubly fed Induction Generators-Equivalent circuits-Reactive power and harmonics-Double output system with VSI-Variable voltage, variable frequency generation-circuit model and steady state operation and characteristics- effect of wind generator on the network. Wind speed measurements-Wind speed statistics-site and turbine selection.

**TEXT BOOKS:**

1. Renewable Energy by Bent Sorensen, Academic Press, 4th edition.

2. Solar Photovoltaic fundamentals, Technology and applications, Chetan Singh Solanki, PHI

Publications, 2nd edition

3. Wind Electrical Systems by S. N Bhadra, D. Kastha and S Banerjee, Oxford press publications

**REFERENCE BOOKS:**

1. Power plant technology by EL-Wakil, Mc Graw-Hill

2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

3. Renewable Energy Sources by John Twidell & Toney Weir : E&F.N. Spon

4. Renewable Energy Sources: Their impact on global warming and pollution by Abbasi & Abbasi

–PHI

**Web Resources:**

W1: https://en.wikipedia.org/wiki/Solar\_System

W2: https://en.wikipedia.org/wiki/Wind

W3: https://en.wikipedia.org/wiki/Tidal\_power

W4: <https://en.wikipedia.org/wiki/Geothermal_energy>

W5: <https://en.wikipedia.org/wiki/Biomass>

W6: http://www.eolss.net/sample-chapters/c08/e3-08-01-04.pdf

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Objectives**

1. To know the various energy conversion principles that facilitates to harness renewable energies
2. To understand the basics of solar cell modelling and characteristics
3. To gain the knowledge about various thin film solar cell technologies and understand various issues related to the design, manufacturing and testing of solar cells
4. To know the major electrical components of the BoS (Balance of System)
5. To know several schemes of variable speed wind turbines and generators, other integration issues of wind electrical system

**COURSE OUTCOMES:**

Upon successful completion of the course, the student will be able to:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | **C415.1**: Apply the heat energy, mechanical energy, solar energy, chemical energy, bioenergy conversion principles to extract energy from Renewable Energy Sources **(Apply)** | | **C415.2:** Understand about the basics of solar cell, generation of photo voltage, characteristics and various factors that effects the efficiency of solar cell **(understand)** | | **C415.3:** know various thin film deposition techniques, materials used for deposition, their features and advantages and understand different types of connections of cells, their mismatches and design related issues**(understand)** | | **C415.4:** Understand the Balance of Solar PV system and its components like DC-DC converters and maximum power point tracking algorithms**(understand)** | | **C415.5:** Understand the assessment of wind energy potential, wind turbines and wind generators. **(understand**) | |
|  |
|  |
|  |
|  |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**MAPPING COS WITH POS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|  | 3 |  |  |  |  | 3 | 3 |  |  |  |  | 1 |
|  | 2 | 2 |  |  |  | 3 |  |  |  |  |  | 1 |
|  |  |  |  | 2 |  | 3 |  |  |  |  |  |  |
|  |  | 2 |  |  |  | 3 |  |  |  |  |  |  |
|  | 2 |  |  |  |  | 3 | 3 |  |  |  |  | 1 |
| **C415** | 2.33 | 2 |  | 2 |  | 3 | 3 |  |  |  |  | 1 |

1. **Low 2. Medium 3. High**

**MAPPING COS WITH PSOS**

|  |  |  |  |
| --- | --- | --- | --- |
| **CO** | **PSO1** | **PSO2** | **PSO3** |
|  |  | 3 |  |
|  |  | 3 |  |
|  |  | 3 |  |
|  |  | 3 |  |
|  |  | 3 |  |
|  |  | 3 |  |

Signature of the Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **SL. No** | **Name of the Topic** | **Reference Book** | **Delivery Method** |
| 1 | Renewable energy technologies- Basic principles of Energy conversion | T1(3-12) | Chalk-Talk |
| 2 | Heat energy conversion principles- direct thermoelectric conversion, engine conversion of solar energy | T1(17-32) | Chalk & Talk |
| 3 | Heat energy conversion principles- Heat pumps Geothermal and Ocean-thermal Energy conversion | PPT |
| 4 | Mechanical energy conversion principles | T1(34-92) | Chalk & Talk |
| 5 | Solar radiation conversion- Photovoltaic conversion | T1(94-126) | Chalk & Talk |
| 6 | Solar radiation conversion- Photo electro chemical conversion | T1(127-136) | PPT |
| 7 | Solar radiation conversion- Solar thermal conversion | T1(137-158), R1(543-558) | Chalk & Talk |
| 8 | Fuel cells -Basic Principles of Hydrogen - Oxygen fuel cell- Factors effecting the Power output - Maximum Power output | T1(169-173) | Chalk & Talk |
| 9 | Bio energy conversion process – Combustion of Bio- Mass | T1(186-194) | Chalk & Talk |
| 10 | Bio energy conversion process - composting of Bio- Mass & Production of heat by biomass | T1(186-194)  T1(195-206) | Chalk & Talk |
| 11 | Biological conversion into gaseous fuels | Chalk & Talk |
| 12 | Biological conversion into liquid fuels | T1(207-213) | Chalk & Talk |
| 13 | Introduction to solar energy | R2(47), R3(85-145), W3 | Video Lecture |
| 14 | P-n junction under illumination- Solar cell, Generation of photo voltage | T2(89-91), W3 | Chalk & Talk |
| 15 | Light generated current, I-v equation of solar cell | T2 (91-92), W3 | Chalk & Talk |
| 16 | Solar cell characteristics | T2 (93-94), W3 | Chalk & Talk |
| 17 | Upper limits of cell parameters- Short circuit current, Open circuit voltage | T2 (96-99) | Chalk & Talk |
| 18 | Upper limits of cell parameters- Fill factor, Efficiency | T2 (99-100) | Chalk & Talk |
| 19 | Losses in solar cells, Model of solar cell | T2 (101-103) | Chalk & Talk |
| 20 | Effect of series and shunt resistance on efficiency, Effect solar radiation on efficiency | T2 (103-105) | Chalk & Talk |
| 21 | Effect of temperature on efficiency | T2 (105-106) | Chalk & Talk |
| 22 | Basic design aspects of solar cells- Design for high Isc – requirements, choice of junction depth and orientation | T2 (107-110) | Chalk & Talk |
| 23 | Basic design aspects of solar cells- Design for high Isc –minimization of optical losses, minimization of recombination | T2 (110-116) | Chalk & Talk |
| 24 | Basic design aspects of solar cells- Design for high Voc | T2 (116-118) | Chalk & Talk |
| 25 | Basic design aspects of solar cells- Design for high fill factor | T2 (118-121) | Chalk & Talk |
| 26 | Thin film solar cell technologies- Generic advantages of thin film technologies | T2 (209-211) | Video Lecture |
| 27 | Materials for thin film technologies | T2 (211-212) | PPT |
| 28 | Thin film de position techniques- evaporation, sputtering LPCVD and APCVD | T2 (212-215), W1 | PPT |
| 29 | Thin film de position techniques- plasma enhanced CVD, hot wire CVD, closed space sublimation, ion assisted deposition | T2 (215-218) | PPT |
| 30 | Common features of thin film technologies. | T2 (218-226) | Chalk & Talk |
| 31 | Third generation solar cells: intermediate band materials, novel thin film materials, multiband semiconductors, hot carrier devices, spectrum splitting. | W4 | Video Lecture |
| 32 | Solar PV modules from solar cells | T2 (352-353) | Chalk & Talk |
| 33 | Series and parallel connection of cells | T2 (353-354) | Chalk & Talk |
| 34 | Mismatch in series and parallel connection. | T2 (354-361) | Chalk & Talk |
| 35 | Design and structure of PV modules: Number of solar cells in a module, Wattage of modules, Fabrication of PV modules | T2 (361-365) | Chalk & Talk |
| 36 | PV module power output- I-V equation of P.V modules | T2 (365-367) | Chalk & Talk |
| 37 | Ratings of P.V modules | T2 (367-368) | Chalk & Talk |
| 38 | I-V and Power curves of module. | T2 (368-373) | Chalk & Talk |
| 39 | DC – DC convertors used in Solar systems-Buck type DC -DC converter | T2 (391-394), W2 | Student Seminar |
| 40 | DC – DC convertors used in Solar Systems-Boost type DC -DC converter | T2 (394-395), W2 | Student Seminar |
| 41 | DC – DC convertors used in Solar systems-Buck-Boost type DC -DC converter | T2 (396-397), W2 | Student Seminar |
| 42 | Maximum power point tracking algorithms | T2 (408-416) | Chalk & Talk |
| 43 | Wind energy systems- Classification | R2 (260-262) | Video Lecture |
| 44 | Generation schemes with variable speed turbines- Classification of schemes | T3 (244-246) | Chalk & Talk |
| 45 | Operating area | T3 (246-247) | Chalk & Talk |
| 46 | Induction generators- cage rotor induction generator – controlled firing angle scheme with ac side capacitor | T3 (247-252) | Chalk & Talk |
| 47 | Induction generators- cage rotor induction generator – inverter or converter system with DC side capacitor-the scalar method | T3 (252-256) | Chalk & Talk |
| 48 | Induction generators- cage rotor induction generator – inverter or converter system with DC side capacitor-the flux vector scheme | T3 (256-261) | Chalk & Talk |
| 49 | Doubly fed induction generators | T3 (261-262 & 185-187) | Chalk & Talk |
| 50 | Equivalent circuits-the AC equivalent Circuit | T3 (187-190) | Chalk & Talk |
| 51 | Equivalent circuits- the Dc equivalent Circuit | T3 (190-193) | Chalk & Talk |
| 52 | Reactive power and harmonics | T3 (193-194) | Chalk & Talk |
| 53 | Double output system with a voltage source inverter | T3 (195-200) | Chalk & Talk |
| 54 | Variable voltage - Variable frequency generation – self excitation process | T3 (204-207) | Chalk & Talk |
| 55 | Variable voltage - Variable frequency generation – Circuit model | T3 (207-210) | Chalk & Talk |
| 56 | Variable voltage - Variable frequency generation – steady state operation and characteristics | T3 (210-214) | Chalk & Talk |
| 57 | Variable voltage - Variable frequency generation –the steady state characteristics | T3 (214-217) | Chalk & Talk |
| 58 | Effect of wind generator on the network | T3 (220-222) | Chalk & Talk |
| 59 | Wind speed measurements | T3 (54-57) | Chalk & Talk |
| 60 | Wind speed statistics, Site and turbine selection | T3 (60-64) | Chalk & Talk |

**TEXT BOOKS**:

1. Bent Sorensen renewable energy conversion, transmission and storage.

2. Solar Photovoltaic fundamentals, Technology and applications, Chetan Singh Solanki, PHI

Publications, 2nd edition

3. Wind Electrical Systems by S. N Bhadra, D. Kastha and S Banerjee, Oxford press publications

**REFERENCE BOOKS:**

1. Power plant technology by EL-Wakil, Mc Graw-Hill

2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

3. Renewable Energy Sources by John Twidell & Toney Weir : E&F.N. Spon

4. Renewable Energy Sources: Their impact on global warming and pollution by Abbasi & Abbasi

–PHI

**Web Resources:**

W1:<http://www.semicore.com/news/81-what-is-thin-film-deposition>

W2:<https://pdfs.semanticscholar.org/de17/076d79013600eefcc9ac44da81ab18451f22.pdf>

W3:<https://ocw.mit.edu/courses/mechanical-engineering/2-627-fundamentals-of-photovoltaics-fall-2013/index.htm>

W4:<https://ocw.mit.edu/courses/mechanical-engineering/2-627-fundamentals-of-photovoltaics-fall-2013/lecture-videos-slides/2011-lecture-15-advanced-concepts/>

Signature of the Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Gap With in the Syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Description** | |  | | --- | | **Source for Discussion** | | |  | | --- | | **Relevance with COs** | | |  | | --- | | **Relevance with PSOs** | |
| 1 | Introduction to Solar Energy | WEB | C415.2 | PSO2 |

**Topic Mapping with POs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| Introduction to Solar Energy | 2 | 2 | - | - | - | 3 |  | - | - |  | - | 1 |

***Indicate strength of mapping (1/2/3) with justification***

* Introduction to Solar Energy is focused on Understand Skill Blooms level, it is Mapped with PO 1,2,6,12

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**List of topics beyond syllabus**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Topic** | |  | | --- | | **Source for Discussion** | | |  | | --- | | **Relevance with Cos** | | |  | | --- | | **Relevance with PSOs** | |
| 1 | Third generation solar cells: intermediate band materials, novel thin film materials, multiband semiconductors, hot carrier devices, spectrum splitting. | Web | CO416.2 | PSO2 |

**Topic Mapping with POs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| Third generation solar cells: intermediate band materials, novel thin film materials, multiband semiconductors, hot carrier devices, spectrum splitting. | 2 | 2 | - | - | - | 3 |  | - | - |  | - | - |

***Indicate strength of mapping (1/2/3) with justification***

* Third generation solar cells: intermediate band materials, novel thin film materials, multibandsemiconductors, hot carrier devices, spectrum splitting is focused on Analyze Skill Blooms level, it is Mapped with PO 1,2,6

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Web Resources:**

W1:<http://www.semicore.com/news/81-what-is-thin-film-deposition>

W2:<https://pdfs.semanticscholar.org/de17/076d79013600eefcc9ac44da81ab18451f22.pdf>

W3:<https://ocw.mit.edu/courses/mechanical-engineering/2-627-fundamentals-of-photovoltaics-fall-2013/index.htm>

W4:<https://ocw.mit.edu/courses/mechanical-engineering/2-627-fundamentals-of-photovoltaics-fall-2013/lecture-videos-slides/2011-lecture-15-advanced-concepts/>

s

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**UNIT WISE QUESTIONS**

**UNIT WISE QUESTIONS**

**Unit-I**

**Short Answer Questions:**

1. List few non-convectional energy resources.

**A:** Solar, Wind, Ocean, Biogas and Biomass etc.

1. What are the main advantages of non-convectional energy sources?

**A:** Pollution free, sustainable, cheaply available

1. Specify the three limitations of Renewable energy sources.

**A:** Initial cost is high, solar energy is available at daytime only, Geothermal energy can bring toxic chemicals

1. What are the various non-convectional energy resources available for power production?

**A:** Solar, Wind, Ocean, Biogas and Biomass, Geothermal Etc.

1. What is meaning of Renewable energy sources?

**A: ‘**Energy obtained from natural and persistent flows of energy occurring in the immediate environment’. An obvious example is solar (sunshine) energy, where ‘repetitive’ refers to the 24-hour major period. Note that the energy is already passing through the environment as a *current* or *flow*, irrespective of there being a device to intercept and harness this power. Such energy may also be called *Green Energy* or *Sustainable Energy*.

1. Explain the limitations of Renewable energy sources

**A:** Reliability, cost, efficiency, and storage etc.

1. What is meant by biomass?

**A:** Biomass is plant or animal material used Biomass is plant or animal material used for energy production (electricity or heat) or used in various industrial processes as raw material for a range of products. Ex: - wood or forest residues, waste from food crops (wheat straw, bagasse), horticulture (yard waste), food processing (corn cobs), animal farming (manure, rich in nitrogen and phosphorus), or human waste from sewage plants.

1. What is the approximate amount of total power generation in India?

**A:** The national electric grid in India has an installed capacity of 360.788 GW as of 31 August 2019.

1. What is meant by load curve?

**A:** In a power system, a load curve or load profile is a chart illustrating the variation in demand/electrical load over a specific time. Generation companies use this information to plan how much power they will need to generate at any given time.

**Essay Questions:**

1. What are renewable sources of energy and explain briefly
2. What is fuel cell? Classify different types of fuel cells?
3. Explain energy conversion from photo chemical process.

### Write a note on biological conversion in gaseous liquid biofuel.

1. Explain Ultimate Energy sources and Natural Energy Currents on Earth.
2. Explain the heat energy, mechanical energy conversion principles.
3. Write a comparison between renewable and conventional energy sources.
4. Write a short note on maximum power output conditions for bioenergy conversion?

**Unit-II**

**Short Answer Questions:**

1. Explain the term solar cell.

**A:**  A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect

1. Define term solar constant.

**A:**  It is the rate at which energy reaches the earth's surface from the sun, usually taken to be 1,388 watts per square meter.

1. List down some applications of solar energy

**A:**  Some of the major application of solar energy are as follows: (a) Solar water heating (b) Solar heating of buildings (c) Solar distillation (d) Solar pumping (e) Solar drying of agricultural and animal products (f) Solar furnaces (g) Solar cooking (h) Solar electric power generation (i) Solar thermal power production (j) Solar green houses.

1. Define short circuit current in a solar cell

**A:**  The short-circuit current is the current through the solar cell when the voltage across the solar cell is zero (i.e., when the solar cell is short circuited). The short-circuit current is due to the generation and collection of light-generated carriers.

1. What is fill factor?

**A:**  The fill factor is the ratio of the actual maximum obtainable power to the product of the open circuit voltage and short circuit current. Fill Factor is a measure of the “squareness” of the IV curve.

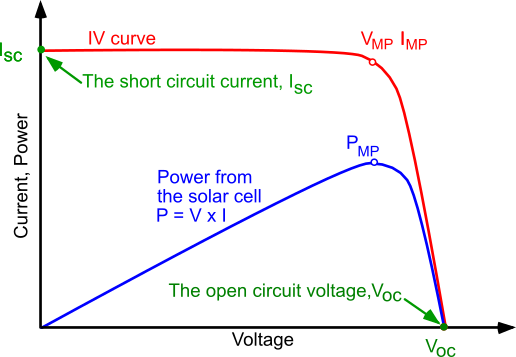
1. Define efficiency of solar cell?

**A:**  Efficiency is defined as the ratio of energy output from the solar cell to input energy from the sun. The efficiency depends on the spectrum and intensity of the incident sunlight and the temperature of the solar cell.

1. Define open circuit voltage of solar cell

**A:**  The open-circuit voltage, VOC, is the maximum voltage available from a solar cell, and this occurs at zero current. The open-circuit voltage corresponds to the amount of forward bias on the solar cell due to the bias of the solar cell junction with the light-generated current.

1. Draw the i-v curve of a solar cell.

**A:**  

1. What are the components of solar water heater?

**A:** plat plate solar collector, absorber, insulation

1. What is meant by solar tracking?

**A:** Trackers direct solar panels or modules toward the sun. These devices change their orientation throughout the day to follow the sun's path to maximize energy capture.

1. Define solar radiation

**A:** Solar radiation is radiant energy emitted by the sun from a nuclear fusion reaction that creates electromagnetic energy.

1. What is photovoltaic system

**A:**  The energy conversion devices which are used to convert sunlight to electricity by the use of the photovoltaic effect are called solar cell (or) Photovoltaic system.

**Essay Questions:**

1. Enumerate the basic design aspects and techniques of solar cells. Also explain the temperature effect on solar cell performance.
2. Explain the equivalent circuit for solar cell.
3. Explain the different characteristics of solar cell.
4. Explain the effect of shunt and series resistance parameters on the solar cell performance.
5. What are the design criteria for obtaining high open circuit voltage?
6. Give the one diode and two diode model of solar cell. How are optical and electrical losses represented in the model?
7. How do the series resistance and shunt resistance of a solar cell affect the fill factor? What should ideally be the values of series resistance and shunt resistance of a solar cell?
8. What are the different types of losses in solar cells? How is the electrical loss mechanism different from the optical loss mechanism?
9. What is the upper limit for short circuit current, pen circuit voltage and fill factor of a single junction solar cell?

**Unit-III**

**Short Answer Questions:**

1. What is thin film deposition technique?

**A:** Thin Film Deposition is the technology of applying a very thin film of material – between a few nanometers to about 100 micrometers, or the thickness of a few atoms – onto a “substrate” surface to be coated, or onto a previously deposited coating to form layers.

1. What is MPPT?

**A**: MPPT or Maximum Power Point Tracking is algorithm that included in charge controllers used for extracting maximum available power from PV module under certain conditions. The voltage at which PV module can produce maximum power is called maximum power point (or peak power) voltage. Maximum power varies with solar radiation, ambient temperature and solar cell temperature.

1. List out the advantages of thin film technology?

**A:** Less Silicon material required, Better performance under low-irradiation condition, ultra large area process is practicable, Customized designation and production

1. Why are thin film technologies referred as the second-generation solar cells?

**A**: Second-generation solar cells are called thin-film solar cells because they are made from amorphous silicon or non-silicon materials such as cadmium telluride. Thin film solar cells use layers of semiconductor materials only a few micrometers thick.

1. What are the normally used thin film deposition techniques?

**A:** Techniques used for epitaxial growth of thin films include molecular beam epitaxy, chemical vapor deposition, and pulsed laser deposition

1. What are the mismatch losses in solar PV modules?

**A:** Shading of one region of a module compared to another is a major cause of mismatch in PV modules. Mismatch in PV modules occurs when the electrical parameters of one solar cell are significantly altered from those of the remaining devices

1. What are hot spots? What is the case of hot spots in a PV module?

**A:** Hot spots are areas of elevated temperature affecting only part of the solar panel. They are a result of a localized decrease in efficiency, which results in lower power output and an acceleration of the materials degradation in the affected area

1. Describe the functions of a buck type Dc to Dc converter

**A**: A buck converter (step-down converter) is a DC-to-DC power converter which steps down voltage (while stepping up current) from its input (supply) to its output (load).

**Essay Questions:**

1. Explain the advantages of thin film technology for a solar cell in detail.
2. On which factors the wattage and voltage of a solar panel will be decided and how the cell configuration will be chosen.
3. What are the materials used for thin film technology in making PV cell? Explain thin film technology in brief.
4. Explain about MPPT algorithm used in solar PV system.
5. Write a short note on role of DC-DC converter in solar power generation.
6. How does a DC to Dc converter change the Dc voltage from one level to the other? What is the role of an inductor in Dc to Dc converter circuits?
7. How does a DC to Dc converter help in maximum power transfer? Which type of converter should selected for the given application?
8. What is the principle of a buck-boost type converter? derive the expression for the voltage gain and show that the output can be either lower or higher than the input voltage.

**Unit-IV**

**Short Answer Questions:**

1. Define horizontal axis wind turbine and name any one such turbine

**A:** Horizontal-axis wind turbines (HAWT) have the main rotor shaft and electrical generator at the top of a tower and must be pointed into the wind.

1. What is wind power

**A:** definition for a wind turbine is a type of device that transforms kinetic energy from the mainly from the wind into electric power

1. Define tip speed ratio

**A:** The ratio between the tangential speed of the tip of a blade and the actual speed of the wind

1. What is meant by pitch angle?

**A:** The angle of climb (slope) is the angle between the horizontal axis and the turbine path

1. What is planetary wind

**A:** The winds blowing throughout the year from one latitude to another in response to latitudinal differences in air pressure are called “planetary or prevailing winds”

1. What are the types of windmills?

**A:** Horizontal windmills and vertical windmills.

1. What is the basic principle of wind energy conversion?

**A:** Any device capable of slowing down the mass of moving air, like a sail or propeller, can extract part of the energy and convert is into useful work.

1. What are the basic components of wind energy conversion plant?

**A:** Wind turbine, gear box, controller, generator etc.

1. How the windmills are classified

**A:** The rotation of wind turbine they are classified Horizontal and vertical

1. What are the advantages of wind energy?

**A:** Non-polluting, renewable energy, high efficiency conversion

1. Define vertical axis wind turbine

**A:** A vertical-axis wind turbines (VAWT) is a type of wind turbine where the main rotor shaft is set transverse to the wind (but not necessarily vertically) while the main components are located at the base of the turbine

1. Mention any two advantages of vertical axis turbine over horizontal axis turbine

**A:** rotor blades can accept the wind form any direction, elimination of yaw controller.

1. What is the cause of origin of local winds? Describe briefly

**A:**Local Winds blow over a much smaller area and change direction and speed over a shorter period

**Essay Questions:**

1. Explain the principle and application of wind electric system. State the basic components and their working in wind electric system.
2. Explain the doubly fed induction generator as a wind generator
3. Explain briefly about induction generator that are used in wind energy systems
4. Discuss about maximum power and actual power of the windmill.
5. Explain about variable frequency and variable speed wind generators.
6. Write a note on a) VSI inverters, b) wind speed measurements., c) Harmonics
7. Discuss about different speed control mechanisms of wind turbines.
8. (a) State the essential features of a probable site for a wind form

(b) Write in brief about vertical axis windmills

1. Explain different types of windmills with merits, demerits and limitations.
2. Explain the terms maximum power and actual power.
3. Write short notes on
4. Principle of wind power
5. Wind turbine operation
6. With a neat diagram, explain how wind energy can be converted into electrical energy
7. Write short notes on

a) Horizontal type windmills.

b) Applications of wind energy

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**List of ICTs used**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.no** | **Date** | **Topic** | **ICT** |
| 1 | 1-Aug-2018 | Heat energy conversion principles- Heat pumps Geothermal and Ocean-thermal Energy conversion | LCD projector and PC |
| 2 | 7-Aug-2018 | Solar radiation conversion- Photo electro chemical conversion | LCD projector and PC |
| 3 | 11-Aug-2018 | Introduction to solar energy | Video Lecture |
| 4 | 4-Sep-2018 | Thin film solar cell technologies- Generic advantages of thin film technologies | Video Lecture |
| 5 | 25-Sep-2018 | Materials for thin film technologies | LCD projector and PC |
| 6 | 14-Oct-2018 | Thin film de position techniques- evaporation, sputtering LPCVD and APCVD | LCD projector and PC |
| 7 | 24-Oct-2018 | Thin film de position techniques- plasma enhanced CVD, hot wire CVD, closed space sublimation, ion assisted deposition | LCD projector and PC |
| 8 | 30-Oct-2018 | Third generation solar cells: intermediate band materials, novel thin film materials, multiband semiconductors, hot carrier devices, spectrum splitting. | Video Lecture |
| 9 | 1-Nov-2018 | DC – DC convertors used in Solar systems | Student Seminar |
| 10 | 17-Nov-2018 | Wind energy systems- Classification | LCD projector and PC |

Signature of Faculty

(Mr.G.Satish)



|  |  |  |
| --- | --- | --- |
| Class: **IV/IV B.Tech** | **I Mid-term Examinations** | Date :28/08/2019 |
| Branch: **EEE** | **NEW & RENEWABLE ENERGY SOURCES** | Time :**90 Min** |
| Sub Code: **EE-415** |  | Max. Marks :**18** |

**SECTION-A**

**Answer All Questions: (6 x 1 = 6M)**

1. a) List any two renewable sources of energy. (PO 6, 7) (CO 1) **(Understand)**

b) What is the approximate amount of total power generation in India? (PO 6, 7) (CO 1, 2, 5) **(Understand)**

c) What is wind power? (PO 1, 6, 7) (CO 1, 5) **(Understand)**

d) Mention two important wind turbine generator installations in India? (PO 1, 6, 7) (CO 1, 5) **(Understand)**

e) What is meant by Biomass? (PO 1, 6, 7) (CO 1) **(Understand)**

f) Write any four differences between renewable and Non-Renewable Sources. (PO 1, 6, 7) (CO 1, 2, 5) **(Understand)**

**SECTION-B (1x 6 = 6M)**

1. What is thermo electric generator? Explain its principle of operation and working. (PO 1,6,7,12) (CO 1) **(Apply)**

**(OR)**

1. What is MHD? What is the principle behind its working? How it works (PO 1,6,7,12) (CO 1) (**Understand)**

**SECTION-C (1 x 6 = 6M)**

1. Draw the characteristics of solar cell and explain about Short Circuit Current Open Circuit Voltage, Fill Factor Efficiency of a solar cell. (PO 1,6,7) (CO 2) **(Understand)**

**(OR)**

1. Explain the effect of shunt and series resistance parameters on the solar cell performance (PO 1,6,7) (CO 1,2,3) **(Understand).**

Signature of Faculty

(Mr.G.Satish)



|  |  |  |
| --- | --- | --- |
| Class : **IV/IV B.Tech** | **II Mid-term Examinations** | Date : |
| Branch **: ECE-A** | **RENEWABLE ENERGY SOURCES** | Time : **90 Min** |
| Sub Code : **EE-416/1** |  | Max.Marks :**18** |

**SECTION-A**

**Answer All Questions: (6 x 1 = 6 M)**

1. a) What are the types of wind mills (PO 1,6,7) (CO 1,2,3) **(Remembering)**

b) What are the advantages of wind energy(PO 1,6,7) (CO 1,2,3) **(Remembering)**

c) Define tip speed ratio(PO 1,6,7) (CO 1,2,3) **(Remembering)**

d) List the advantages of bio-gas(PO 1,6,7) (CO 1,2,3) **(Remembering)**

e) What is digester (PO 1,6,7) (CO 1,2,3) **(Remembering)**

f) List out the geothermal resources (PO 1,6,7) (CO 1,2,3) **(Remembering)**

**SECTION-B (6\*1=6 M)**

1. Sketch how wind energy can be converted into electrical energy (PO 1,6,7) (CO 1,2,3) (**Applying)**

**(OR)**

1. Write short notes on (PO 1,6,7) (CO 1,2,3) **(Applying)**

a) Horizontal type wind mills.

b) Applications of wind energy

**SECTION-C (6\*1=6 M)**

1. Write short notes on (PO 1,6,7) (CO 1,2,3) **(Applying)**
2. Principle of OTEC plant operation
3. Bio-gas digester

**(OR)**

1. Classify the bio-gas plant and write about each of them with neat sketch? (PO 1,6,7) (CO 1,2,3)

(**Understand)**



|  |  |  |
| --- | --- | --- |
| Class: **IV/IV B.Tech** | **Assignment-I** | Date: 28-08-2019 |
| Branch: **EEE** | **NEW & RENEWABLE ENERGY SOURCES** |  |
| Sub Code: **EE-415** |  | Max. Marks :**12** |

1. Draw the table Showing Various Devices that convert from One energy form to another energy form. (PO 1,6,7) (CO 1) (**Apply**)
2. What is a thermo electric generator? Explain the principle and working of Thermo electric generator? (PO 1,6,7,12) (CO 1) (**Apply)**
3. State the working principle of Hot air Engine with neat sketch? (PO 1,6,7,12) (CO 1) **(Apply)**
4. Draw the characteristics of a solar cell and define , FF and efficiency of solar cells. (PO 1,2,6) (CO 2) (**Understand)**
5. What are the different types of losses in solar cells and how to minimize them? PO 1,2,6) (CO 2) **(Understand)**
6. Give the one diode and two diode model of a solar cell. How are Optical and electrical losses represented in the model? In what Condition is One diode Model used? (PO 1,2,6) (CO 2) **(Understand)**

Signature of Faculty

(Mr.G.Satish)



|  |  |  |
| --- | --- | --- |
| Class : **IV/IV B.Tech** | **Assignment-II** | Date : |
| Branch **: ECE-A** | **RENEWABLE ENERGY SOURCES** |  |
| Sub Code : **EE-416** |  | Max.Marks :**12** |

1. (a) Write the essential features of a probable site for a wind form(PO 1,6,7) (CO 1,2,3) **(Applying)**

(b) Discuss in brief about vertical axis wind mills (PO 1,6,7) (CO 1,2,3) **(Understand)**

1. Explain different types of wind mills with merits, demerits and limitations

(CO 1,2,3) (PO 1,6,7) (**Understand)**

1. Classify the bio-gas plant and write about each of them with neat sketch (PO 1,6,7)(CO 1,2,3) **(Understand)**
2. Write short notes on (CO 1,2,3) (PO 1,6,7) **(Applying)**
3. Principle of wind power
4. Wind turbine operation
5. Sketch how wind energy can be converted into electrical energy (PO 1,6,7) (CO 1,2,3) **(Applying)**
6. Write short notes on (PO 1,6,7) (CO 1,2,3) **(Applying)**

a) Horizontal type wind mills.

b) Applications of wind energy

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Internal Question Papers Mapped with CO**

**Mid-I EXAMINATION**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q 1** | **Question** | **Marks** | **CO** | **PO** | **PSO** | **Bloom’s Level** | **Marks Weightage** | **% of Marks** |
| 1 | List any two renewable sources of energy. | 1M | C415.1 | 6,7 | 2 | L2 | 1/30 | 3.3% |
| What is the approximate amount of total power generation in India? | 1M | C415.1,2,5 | 6,7 | 2 | L2 | 1/30 | 3.3% |
| What is wind power? | 1M | C415.1,5 | 1,6,7 | 2 | L2 | 1/30 | 3.3% |
| Mention two important wind turbine generator installations in India? | 1M | C415.1,5 | 1,6,7 | 2 | L2 | 1/30 | 3.3% |
| What is meant by Biomass? | 1M | C415.1 | 1,6,7 | 2 | L2 | 1/30 | 3.3% |
| Write any four differences between renewable and Non-Renewable Sources. | 1M | C415.1,2,5 | 1,6,7 | 2 | L2 | 1/30 | 3.3% |
| 2 | What is thermo electric generator? Explain its principle of operation and working. | 6M | C415.1 | 1,6,7,12 | 2 | L3 | 6/30 | 20% |
| 3 | What is MHD? What is the principle behind its working? How it works? | 6M | C415.1 | 1,6,7,12 | 2 | L3 | 6/30 | 20% |
| 4 | Draw the characteristics of solar cell and explain about Short Circuit Current Open Circuit Voltage, Fill Factor Efficiency of a solar cell. | 6M | C415.2 | 1,6,7 | 2 | L2 | 6/30 | 20% |
| 5 | Explain the effect of shunt and series resistance parameters on the solar cell performance. | 6M | C415.2 | 1,6,7 | 2 | L2 | 6/30 | 20% |

**Mid-II EXAMINATION**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q 1** | **Question** | **Marks** | **CO** | **PO** | **PSO** | **Bloom’s Level** | **Marks Weightage** | **% of Marks** |
| 1 | What are the types of wind mills | 1M | C416.1,2,3 | 1,6,7 | 1 | L2 | 1/30 | 3.3% |
| What are the advantages of wind energy | 1M | C416.1,2,3 | 1,6,7 | 1 | L1 | 1/30 | 3.3% |
| Define tip speed ratio | 1M | C416.1,2,3 | 1,6,7 | 1 | L1 | 1/30 | 3.3% |
| List the advantages of bio-gas | 1M | C416.1,2,3 | 1,6,7 | 1 | L1 | 1/30 | 3.3% |
| What is digester | 1M | C416.1,2,3 | 1,6,7 | 1 | L1 | 1/30 | 3.3% |
| List out the geothermal resources | 1M | C416.1,2,3 | 1,6,7 | 1 | L1 | 1/30 | 3.3% |
| 2 | Sketch how wind energy can be converted into electrical energy | 6M | C416.1,2,3 | 1,6,7 | 1 | L3 | 6/30 | 20% |
| 3 | Write short notes on  a) Horizontal type wind mills.  b) Applications of wind energy | 6M | C416.1,2,3 | 1,6,7 | 1 | L3 | 6/30 | 20% |
| 4 | Write short notes on   1. Principle of OTEC plant operation 2. Bio-gas digester | 6M | C416.1,2,3 | 1,6,7 | 1 | L3 | 6/30 | 20% |
| 5 | Classify the bio-gas plant and write about each of them with neat sketch? | 6M | C416.1,2,3 | 1,6,7 | 1 | L2 | 6/30 | 20% |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Assignment Question Papers Mapped with CO**

**Assignment-I**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q.No** | **Question** | **Marks** | **CO** | **PO** | **PSO** | **Bloom’s Level** | **Marks** | **% of Marks** |
| 1 | Draw the table Showing Various Devices that convert from One energy form to another energy form. | 12 | C415.1 | 1,6,7,12 | 2 | L3 | 12/72 | 16.6% |
| 2 | What is a thermo electric generator? Explain the principle and working of Thermo electric generator? | 12 | C415.1 | 1,6,7,12 | 2 | L3 | 12/72 | 16.6% |
| 3 | State the working principle of Hot air Engine with neat sketch? | 12 | C415.1 | 1,6,7,12 | 2 | L3 | 12/72 | 16.6% |
| 4 | Draw the characteristics of a solar cell and define , FF and efficiency of solar cells. | 12 | C415.2 | 1,2,6 | 2 | L2 | 12/72 | 16.6% |
| 5 | What are the different types of losses in solar cells and how to minimize them? | 12 | C415.2 | 1,2,6 | 2 | L2 | 12/72 | 16.6% |
| 6 | Give the one diode and two diode model of a solar cell. How are Optical and electrical losses represented in the model? In what Condition is One diode Model used? | 12 | C415.2 | 1,2,6 | 2 | L2 | 12/72 | 16.6% |

**Assignment-II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q.No** | **Question** | **Marks** | **CO** | **PO** | **PSO** | **Bloom’s Level** | **Marks** | **% of Marks** |
| 1 | (a) Write the essential features of a probable site for a wind form | 6 | C416.1,2,3 | 1,6,7 | 3 | L3 | 6/72 | 8.3% |
| (b) Discuss in brief about vertical axis wind mills | 6 | C416.1,2,3 | 1,6,7 | 3 | L2 | 6/72 | 8.3% |
| 2 | Explain different types of wind mills with merits, demerits and limitations | 12 | C416.1,2,3 | 1,6,7 | 3 | L2 | 12/72 | 16.6% |
| 3 | Classify the bio-gas plant and write about each of them with neat sketch | 12 | C416.1,2,3 | 1,6,7 | 3 | L2 | 12/72 | 16.6% |
| 4 | Write short notes on   1. Principle of wind power 2. Wind turbine operation | 12 | C416.1,2,3 | 1,6,7 | 3 | L3 | 12/72 | 16.6% |
| 5 | Sketch how wind energy can be converted into electrical energy | 12 | C416.1,2,3 | 1,6,7 | 3 | L3 | 12/72 | 16.6% |
| 6 | Write short notes on  a) Horizontal type wind mills.  b) Applications of wind energy | 12 | C416.1,2,3 | 1,6,7 | 3 | L3 | 12/72 | 16.6% |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G. SATISH | Year / Sem: B. Tech in EEE - IV/I | Academic Year: 2019-20 |

**Scheme of Evaluation of Internal Question Papers**

**MID-I**

**SECTION-A 6\*1=6M**

|  |  |
| --- | --- |
| 1. a) List any two renewable sources of energy |  |
| * List any 2 Renewable Energy sources | **1M** |
| b) What is the approximate amount of total power generation in India? |  |
| * Give total installed capacity of India in watts | **1M** |
| c) What is wind power? |  |
| * Definition of wind power | **1M** |
| d) Mention two important wind turbine generator installations in India? |  |
| * Mention two wind farms in India | **1M** |
| e) What is meant by Biomass? |  |
| * Definition of Bio – Mass | **1M** |
| f) Write any four differences between renewable and Non-Renewable Sources. |  |
| * Write any four differences | **1M** |

**SECTION-B 1\*6=6M**

|  |  |
| --- | --- |
| 2. What is thermo electric generator? Explain its principle of operation and working. |  |
| * Definition of thermo electric generator | **1M** |
| * Seebeck effect explanation | **2M** |
| * Working of thermo electric generator | **3M** |
| 3. What is MHD? What is the principle behind its working? How it works |  |
| * Definition of Magneto Hydro Dynamic Generator | **1M** |
| * Explain principle | **2M** |
| * Working of Magneto Hydro Dynamic Generator | **3M** |

**SECTION-C 1\*6=6M**

|  |  |
| --- | --- |
| 4. Draw the characteristics of solar cell and explain about Short Circuit Current Open Circuit Voltage, Fill Factor Efficiency of a solar cell. |  |
| * Diagram and Explanation | **2M** |
| * Definition and Formulae of Short circuit Current | **1M** |
| * Definition and Formulae of open circuit voltage | **1M** |
| * Definition and Formulae of form factor FF | **1M** |
| 5. Explain the effect of shunt and series resistance parameters on the solar cell performance. |  |
| * Effect of shunt resistance on I-V characteristics | **3M** |
| * Effect of series resistance on I-V characteristics | **3M** |

**MID-II**

**SECTION-A 6\*1=6M**

1. (a) Name the different classifications of Stepper motor?

* Variable reluctance SM, Permanent Magnet SM, **1M**

(b) What is the use of damper winding?

* For Starting of synchronous motor **1M**

(c) What is meant by synchronous condenser?

* Over excited synchronous motor **1M**

(d) Define step angle in stepper motor?

* Definition of Step angle **1M**

(e) What are the advantages of synchronous motor?

* Any two advantages of SM **1M**

1. List the applications of BLDC?

* Any Three application of BLDC **1M**

**SECTION-B 1\*6=6M**

2. Draw the phasor diagram of synchronous motor. When it is over excited and under excited explain in detail?

* For Drawing of Phasor diagram **1M**
* Explanation of over exited and under exited details with neat diagrams **5M**

3. What are the drawbacks of hunting in synchronous motor? Explain the means of preventing hunting

* Write 5 effects of hunting and preventing methods **6M**

**SECTION-C 1\*6=6M**

4. (a)Explain the Working operation of Universal Motor.

* Working operation of Universal motor with Neat diagrams **4M**

(b) List the applications of Stepper Motor

* Any four applications of stepper motor **2M**

1. (a) Explain the Working operation of BLDC

* Working operation of BLDC with Neat diagrams  **4M**

(b) List the applications of Repulsion motor

* Any four applications of Repulsion motor **2M**



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr. G. SATISH | Year / Sem: B. Tech in EEE - IV/I | Academic Year: 2019-20 |

**Scheme of Evaluation of Assignment Question Papers**

**ASSIGNMENT-1**

|  |  |
| --- | --- |
| 1. Draw the table Showing Various Devices that convert from One energy form to another energy form. |  |
| * 6 Basic energy forms to 7 other energy forms | **6M** |
| 2. What is a thermo electric generator? Explain the principle and working of Thermo electric generator? |  |
| * Definition of thermo electric generator | **1M** |
| * Seebeck effect explanation | **2M** |
| * Working of thermo electric generator | **3M** |
| 3. State the working principle of Hot air Engine with neat sketch? |  |
| * Diagram | **2M** |
| * Explanation of 4 cycles | **4M** |
| 4. Draw the characteristics of a solar cell and define , FF and efficiency of solar cells. |  |
| * Diagram and Explanation | **2M** |
| * Definition and Formulae of Short circuit Current | **1M** |
| * Definition and Formulae of open circuit voltage | **1M** |
| * Definition and Formulae of form factor FF | **1M** |
| * Definition and Formulae of Efficiency | **1M** |
| 5. What are the different types of losses in solar cells and how to minimize them? |  |
| * Unavoidable losses | **3M** |
| * Technological losses | **3M** |
| 6. Give the one diode and two diode model of a solar cell. How are Optical and electrical losses represented in the model? In what Condition is One diode Model used? |  |
| * One diode model diagram and Equation | **2M** |
| * Two diode model Diagram and Equation | **2M** |
| * Explanation about optical losses, electrical losses and Applications | **2M** |

**ASSIGNMENT-II 1\*12=12**

1. Why synchronous motor is not self-starting. What is the different types of starting methods of synchronous motor?
2. Write about condition for not self-start of synchronous motor **6M**
3. Starting methods Prim over, Damper winding **6M**
4. What are the drawbacks of hunting in synchronous motor? Explain the means of preventing hunting.

* Write 5 effects of hunting and preventing methods **12M**

1. Draw the phasor diagram of synchronous motor. When it is over excited and under excited explain in detail?

* For Drawing of Phasor diagram **2M**
* Explanation of over exited and under exited details with neat diagrams **10M**

1. Explain experimental setup to find ‘V’ and inverted ‘V’ curves of synchronous motor with neat diagrams.

* Steps involve to find the V and Inverted V curves with neat experimental diagram  **12M**

1. Explain armature reaction of synchronous motor

* With neat diagram explanation of Armature reaction **12M**

1. What is meaning of power circles in synchronous motor. Explain the method of generating the power circles for a synchronous machine.

* Definition of Power circles of Synchronous machine **2M**
* Procedure to draw the circle diagram **10M**

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**RESULTS ANALYSIS FOR FINDING SLOW AND FAST LEARNERS**

Total number of candidates: 22

**LEVEL-I**

**RESULT ANALYSIS OF PREREQUISITE SUBJECT**

**AC MACHINES (EE-226)**

**II/IV B. Tech II-Sem (R-15) A.Y 2016-17**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SL.NO** | **TOTAL NO OF STUDENTS** | **APPERED** | **PASSED** | **ABOVE 80%** | **SLOW LEARNERS (41-59%)** | **FAIL** |
| 1 | 22 |  |  |  |  |  |

**LIST OF STUDENTS UNDER –Slow Learners (41-59%) in PREREQUISITE SUBJECT:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Roll. No** | **Reg. No** | **Name of the Student** | **Obtained Grade** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**LIST OF STUDENTS UNDER –Fast Learners (Above 80%) in PREREQUISITE SUBJECT:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Roll. No** | **Reg. No** | **Name of the Student** | **Obtained Grade** |
| 3 | Y15EE1207 | BOGINENI PRIYANKA | A+ |

**Questions given for slow learners in Prerequisite Subject:**

1. (a) Derive an Expression for the EMF developed by Alternator

(b) Define the terms of synchronous reactance and Voltage Regulation of alternator.

**REMEDIAL ACTION:** Weekly one question Discussion, learning and writing process. Spot evaluation.

**LEVEL-II**

**RESULT ANALYSIS OF PREVIOUS SEMISTER**

**II/IV B.Tech II-Sem (R-15) A.Y 2016-17**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.NO** | **TOTAL NO OF STUDENTS** | **APPERED** | **PASSED** | **ABOVE 80%** | **FAIL** |
| 1 | 42 | 41 | 16 | 2 | 25 |

**LIST OF STUDENTS UNDER –Slow Learners (Fail) in University Exam**

|  |  |  |  |
| --- | --- | --- | --- |
| **Roll.No** | **Reg.No** | **Name of the Student** | **Obtained Grade** |
| 1 |  |  |  |
| 2 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 12 |  |  |  |
| 15 |  |  |  |
| 16 |  |  |  |
| 21 |  |  |  |
| 22 |  |  |  |
| 24 |  |  |  |
| 25 |  |  |  |
| 26 |  |  |  |
| 28 |  |  |  |
| 29 |  |  |  |
| 31 |  |  |  |
| 32 |  |  |  |
| 33 |  |  |  |
| 34 |  |  |  |
| 38 |  |  |  |
| 39 |  |  |  |
| 42 |  |  |  |

**LIST OF STUDENTS UNDER –Fast Learners (Above 80%) in University Exam**

|  |  |  |  |
| --- | --- | --- | --- |
| **Roll.No** | **Reg.No** | **Name of the Student** | **Obtained Grade** |
| 11 | Y15EE1224 | SHAIK GOUSE BI | A+ |
| 20 | L16EE1230 | BRUNDAVANAM SASANK VENKATAKRISHNA SAI | A+ |

**LEVEL-III**

**RESULT ANALYSIS OF ASSIGNMENT AND MID EXAMS**

**III/IV B.Tech I-Sem (R-15) A.Y 2019-20**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SUB: S&SM** | M1 | A1 | M2 | A2 | **INTERNAL** |
| Students who have attended |  |  |  |  |  |
| Students who are qualified |  |  |  |  |  |
| Students not qualified |  |  |  |  |  |
| Students who are fast learners (>85%) |  |  |  |  |  |
| Students who are medium learners (>60 %&< 84%) |  |  |  |  |  |
| Students who are slow learners (>36 %&< 59%) |  |  |  |  |  |
| Students who are Not Qualified (<35%) |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EVALUATION** | | | | |
|  | **MID MARKS (18)** | **ASSIGNMENT**  **MARKS (12)** | **PERCENTAGE** |
| **FAST LEARNERS** | **16-18** | **11-12** | **above 85-100%** |
| **MEDIUM LEARNERS** | **11-15** | **7-9** | **above 60-84%** |
| **SLOW LEARNERS** | **8-10** | **5-6** | **Above 41-59%** |
| **NOT QUALIFIED** | **0-7** | **1-4** | **below 40%** |

**LIST OF STUDENTS UNDER – SLOW LEARNERS (<59%) IN A1**

| **Roll No’s** | **Regd. Number** | **Name of the student** | **Marks** |
| --- | --- | --- | --- |
| 1 | Y16EC1201 | A.RAMYA SITA | 6 |
| 2 | Y16EC1204 | A. NAGA SWARNALATHA | 0 |
| 3 | Y16EC1206 | A.LAKASHMI JYOTHSNA | 0 |
| 4 | Y16EC1208 | A.SUSHMA | 4 |
| 5 | Y16EC1213 | B.VENKATA GAYATHRI | 3 |
| 6 | Y16EC1214 | B.JANSI RANI | 1 |
| 7 | Y16EC1217 | B.THANMAI REDDY | 6 |
| 8 | Y16EC1218 | B.SRAVANA LAKSHMI | 5 |
| 9 | Y16EC1220 | B.PRAVEENA | 1 |
| 10 | Y16EC1223 | CH.LAVANYA | 6 |
| 11 | Y16EC1224 | CH SAI NAGA LAKSHMI | 6 |
| 12 | Y16EC1228 | D. SIVA PARVATHI | AB |
| 13 | Y16EC1246 | J.PUJITHA | 1 |
| 14 | Y16EC1255 | K.LAKSHMI DINFHU | 1 |
| 15 | Y16EC1256 | K.PRAVALLIKA | 4 |
| 16 | Y16EC1259 | M.LOKESWARI | 5 |
| 17 | Y16EC1260 | M.THIRUMALAGIRI SOWJANAYA | 2 |
| 19 | Y16EC1265 | M.BHAGYA LAKSHMI | 5 |
| 20 | Y16EC1268 | N.LAKSHMI DURGA | 1 |
| 23 | Y16EC1295 | T.VENKATESWARI | 1 |
| 24 | Y16EC1300 | V.MOUNIKA |  |
| 25 | Y16EC1202 | A.VENKATESH | AB |
| 26 | Y16EC1203 | A.LOKESH KUMAR | 1 |
| 27 | Y16EC1205 | A. PAVAN KUMAR | 3 |
| 28 | Y16EC1207 | A.DURGA KOTESWARA RAO | 3 |
| 29 | Y16EC1209 | B.VENKATASIVA SAI TEJA | AB |
| 30 | Y16EC1210 | B.JASHUVA | 1 |
| 31 | Y16EC1211 | B.NAVEEN KUMAR | AB |
| 32 | Y16EC1212 | B.JAGADESH | 0 |
| 33 | Y16EC1215 | B.GURU KRISHNA PRASAD | 0 |
| 34 | Y16EC1216 | B.VENKATA NARSI REDDY | 2 |
| 35 | Y16EC1222 | CH. VISHNU VARDHAN | 1 |
| 36 | Y16EC1225 | CH.NAVEEN TEJA | 3 |
| 37 | Y16EC1226 | CH .MANOHAR KRISHNA | 1 |
| 38 | Y16EC1227 | CH.AMAR | AB |
| 39 | Y16EC1229 | D. SIVA SANKAR | 4 |
| 41 | Y16EC1233 | D.SIVA NAGA RAJU | 5 |
| 42 | Y16EC1234 | D.SAI PRAKSH REDDY | 4 |
| 43 | Y16EC1235 | G.CHAITANYA | 0 |
| 44 | Y16EC1237 | G.RAGAVENDRA NAIDU | 1 |
| 45 | Y16EC1238 | G.PRASAD | 0 |
| 46 | Y16EC1239 | G.SRINIVAS | 1 |
| 47 | Y16EC1240 | G.SIVA | 3 |
| 48 | Y16EC1241 | G.SURESH | 5 |
| 49 | Y16EC1243 | G.JOSEPH KISHORE | 0 |
| 50 | Y16EC1245 | J.SUMANTH | 1 |
| 51 | Y16EC1248 | J.SAI RAJEEV | 0 |
| 52 | Y16EC1252 | K.VISHNU VARDAN BABU | 0 |
| 53 | Y16EC1263 | MANOJ KUMAR .Y | AB |
| 54 | Y16EC1284 | P.RAMA KRISHNA | 0 |
| 56 | Y16EC1292 | S.BHARGAV | 0 |

**LIST OF STUDENTS UNDER –** **MEDIUM LEARNERS (>60% TO <84%) IN A1**

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI | 8 |
| 7 | Y15EE1220 | NANDIGAM DIVYA | 8 |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU | 9 |
| 17 | Y15EE1208 | BOMMISETTI GOPI | 9 |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY | 8 |
| 39 | L16EE1242 | UPPALAPATI VENKATESH | 8 |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR | 9 |

**LIST OF STUDENTS UNDER – SLOW LEARNERS (<59%) IN M1**

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** |
| 3 | Y15EE1209 | CHENNUPATI KALYANI | 9 |
| 7 | Y15EE1220 | NANDIGAM DIVYA | 10 |
| 8 | Y15EE1221 | NELLURI RENUKA | 0 |
| 9 | Y15EE1222 | PALLEPOGU DIVYA | 0 |
| 11 | Y15EE1225 | SHAIK SHAHIRA BEGUM | 1 |
| 12 | Y15EE1202 | ANKAM RAJESH | 10 |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU | 7 |
| 14 | Y15EE1204 | BANKA JAGADEESH | 1 |
| 15 | Y15EE1205 | BELLAM GOPI | 9 |
| 16 | Y15EE1206 | BHAVIRISETTY NAGENDRA BABU | 5 |
| 17 | Y15EE1208 | BOMMISETTI GOPI | 10 |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY | 7 |
| 23 | Y15EE1210 | CHITTINENI GOPALA KRISHNA | 0 |
| 24 | Y15EE1211 | GONDI SAI PRAKASH | 7 |
| 25 | Y15EE1213 | JILLELLA ANVESH | 8 |
| 28 | Y15EE1217 | KORADA KRISHNA GOPI SATYANANDH | 4 |
| 29 | Y15EE1218 | KUKKAMUDI RAJESH | 6 |
| 31 | L16EE1236 | PALAPARTHI VINOD KUMAR | 7 |
| 37 | L16EE1241 | THODETI RAVI TEJA | 9 |
| 39 | L16EE1242 | UPPALAPATI VENKATESH | 7 |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR | 7 |
| 41 | L16EE1244 | YENUMULA BALA PHANEENDRA | 5 |

**LIST OF STUDENTS UNDER –** **MEDIUM LEARNERS (>60% TO <84%) IN M1**

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** |
| 5 | Y15EE1216 | KOMMINENI SRI DEEPTHI | 11 |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI | 12 |
| 20 | L16EE1231 | CHEEMAKURTHI VEERA VENKATA NAGA YASWANTH | 15 |
| 26 | Y15EE1214 | KAILA MADHUBABU | 12 |
| 32 | L16EE1237 | PATHARLAPALLI SAI KUMAR | 13 |
| 34 | L16EE1238 | RAVURI PRAVEEN | 12 |
| 38 | Y15EE1226 | TUMMALA GOPALA REDDY | 15 |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**REMEDIAL CLASS ACTION**

**LIST OF STUDENTS UNDER – SLOW LEARNERS (<59%) IN A1**

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Signature of Student** |
| 3 | Y15EE1209 | CHENNUPATI KALYANI |  |
| 5 | Y15EE1216 | KOMMINENI SRI DEEPTHI |  |
| 8 | Y15EE1221 | NELLURI RENUKA |  |
| 9 | Y15EE1222 | PALLEPOGU DIVYA |  |
| 11 | Y15EE1225 | SHAIK SHAHIRA BEGUM |  |
| 12 | Y15EE1202 | ANKAM RAJESH |  |
| 14 | Y15EE1204 | BANKA JAGADEESH |  |
| 15 | Y15EE1205 | BELLAM GOPI |  |
| 16 | Y15EE1206 | BHAVIRISETTY NAGENDRA BABU |  |
| 20 | L16EE1231 | CHEEMAKURTHI VEERA VENKATA NAGA YASWANTH |  |
| 22 | L16EE1233 | CHERUKURI ANANDA BABU |  |
| 23 | Y15EE1210 | CHITTINENI GOPALA KRISHNA |  |
| 24 | Y15EE1211 | GONDI SAI PRAKASH |  |
| 25 | Y15EE1213 | JILLELLA ANVESH |  |
| 28 | Y15EE1217 | KORADA KRISHNA GOPI SATYANANDH |  |
| 29 | Y15EE1218 | KUKKAMUDI RAJESH |  |
| 30 | L16EE1235 | NALLABOTHU PREMNATH |  |
| 31 | L16EE1236 | PALAPARTHI VINOD KUMAR |  |
| 32 | L16EE1237 | PATHARLAPALLI SAI KUMAR |  |
| 33 | Y15EE1223 | PUTTA BHARGAV MEHER REDDY |  |
| 37 | L16EE1241 | THODETI RAVI TEJA |  |
| 38 | Y15EE1226 | TUMMALA GOPALA REDDY |  |
| 41 | L16EE1244 | YENUMULA BALA PHANEENDRA |  |

**Questions given for slow learners in A-I**

1. (a) Derive an Expression for the EMF developed by Alternator

(b) Define the terms of synchronous reactance and Voltage Regulation of alternator.

1. (a) State the advantages and disadvantages of using short pitched winding distributed winding in alternator.

(b) Explain synchronous impedance method of determining Regulation of alternator.

**REMEDIAL ACTION:** Weekly one question Discussion, learning and writing process. Spot evaluation.

**LIST OF STUDENTS UNDER –** **MEDIUM LEARNERS (>60% TO <84%) IN A1**

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Signature** |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI |  |
| 7 | Y15EE1220 | NANDIGAM DIVYA |  |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU |  |
| 17 | Y15EE1208 | BOMMISETTI GOPI |  |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY |  |
| 39 | L16EE1242 | UPPALAPATI VENKATESH |  |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR |  |

**Questions given for Medium learners in A-I**

1. (a) Explain the procedure for POTIER method to calculate voltage regulation of alternator.

(b) Explain the procedure for MMF method to calculate voltage regulation of alternator.

**REMEDIAL ACTION:** Weekly one question Discussion, learning and writing process. Spot evaluation.

**Question given for slow learners in M-I on**

1. What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized.
2. State and Explain two reaction theory of salient pole machines

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Signature of Student** |
| 3 | Y15EE1209 | CHENNUPATI KALYANI |  |
| 7 | Y15EE1220 | NANDIGAM DIVYA |  |
| 8 | Y15EE1221 | NELLURI RENUKA |  |
| 9 | Y15EE1222 | PALLEPOGU DIVYA |  |
| 11 | Y15EE1225 | SHAIK SHAHIRA BEGUM |  |
| 12 | Y15EE1202 | ANKAM RAJESH |  |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU |  |
| 14 | Y15EE1204 | BANKA JAGADEESH |  |
| 15 | Y15EE1205 | BELLAM GOPI |  |
| 16 | Y15EE1206 | BHAVIRISETTY NAGENDRA BABU |  |
| 17 | Y15EE1208 | BOMMISETTI GOPI |  |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY |  |
| 23 | Y15EE1210 | CHITTINENI GOPALA KRISHNA |  |
| 24 | Y15EE1211 | GONDI SAI PRAKASH |  |
| 25 | Y15EE1213 | JILLELLA ANVESH |  |
| 28 | Y15EE1217 | KORADA KRISHNA GOPI SATYANANDH |  |
| 29 | Y15EE1218 | KUKKAMUDI RAJESH |  |
| 31 | L16EE1236 | PALAPARTHI VINOD KUMAR |  |
| 37 | L16EE1241 | THODETI RAVI TEJA |  |
| 39 | L16EE1242 | UPPALAPATI VENKATESH |  |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR |  |
| 41 | L16EE1244 | YENUMULA BALA PHANEENDRA |  |

**Remedial action:** Weekly one question Discussion, learning and writing process. Spot evaluation

**Question given for Medium learners in M-I on**

1. (a) List the difference between salient and non-salient pole types of rotor construction.

(b) What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized.

1. (a) Explain Armature Reaction of Alternator.

(b) A 500Kva, 1100V, 50Hz star connected 3-phase alternator has armature resistance per phase of 0.1 Ohm and synchronous reactance per phase of 1.5 Ohm. Find its voltage for (i) Unity Power Factor (ii) 0.9 Lagging and (iii) 0.8 Leading. Also, Calculate Voltage Regulation in each case.

1. (a) Explain the procedure for POTIER method to calculate voltage regulation of alternator.

(b) Explain the procedure for MMF method to calculate voltage regulation of alternator.

|  |  |  |  |
| --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Signature of the Student** |
| 5 | Y15EE1216 | KOMMINENI SRI DEEPTHI |  |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI |  |
| 20 | L16EE1231 | CHEEMAKURTHI VEERA VENKATA NAGA YASWANTH |  |
| 26 | Y15EE1214 | KAILA MADHUBABU |  |
| 32 | L16EE1237 | PATHARLAPALLI SAI KUMAR |  |
| 34 | L16EE1238 | RAVURI PRAVEEN |  |
| 38 | Y15EE1226 | TUMMALA GOPALA REDDY |  |

**Remedial action:** Weekly one question Discussion, learning and writing process. Spot Evaluation.

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**RESULT ANALYSIS ASSESSMENT**

**LIST OF STUDENTS UNDER – SLOW LEARNERS (<40 TO 59%) IN A1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** | **Final Examination result** |
| 5 | Y15EE1216 | KOMMINENI SRI DEEPTHI | 6 | PASS |
| 12 | Y15EE1202 | ANKAM RAJESH | 6 | PASS |
| 14 | Y15EE1204 | BANKA JAGADEESH | 5 | PASS |
| 15 | Y15EE1205 | BELLAM GOPI | 5 | PASS |
| 16 | Y15EE1206 | BHAVIRISETTY NAGENDRA BABU | 5 | PASS |
| 20 | L16EE1231 | CHEEMAKURTHI VEERA VENKATA NAGA YASWANTH | 6 | PASS |
| 22 | L16EE1233 | CHERUKURI ANANDA BABU | 6 | PASS |
| 24 | Y15EE1211 | GONDI SAI PRAKASH | 5 | PASS |
| 25 | Y15EE1213 | JILLELLA ANVESH | 5 | PASS |
| 29 | Y15EE1218 | KUKKAMUDI RAJESH | 5 | PASS |
| 30 | L16EE1235 | NALLABOTHU PREMNATH | 7 | PASS |
| 31 | L16EE1236 | PALAPARTHI VINOD KUMAR | 5 | PASS |
| 32 | L16EE1237 | PATHARLAPALLI SAI KUMAR | 5 | PASS |
| 33 | Y15EE1223 | PUTTA BHARGAV MEHER REDDY | 5 | PASS |
| 37 | L16EE1241 | THODETI RAVI TEJA | 5 | PASS |
| 38 | Y15EE1226 | TUMMALA GOPALA REDDY | 7 | PASS |

**LIST OF STUDENTS UNDER –SLOW LEARNERS (<60%TO 85%) IN A-I**

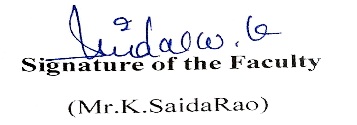
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** | **Final Examination result** |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI | 8 | PASS |
| 7 | Y15EE1220 | NANDIGAM DIVYA | 8 | PASS |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU | 9 | PASS |
| 17 | Y15EE1208 | BOMMISETTI GOPI | 9 | PASS |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY | 8 | PASS |
| 39 | L16EE1242 | UPPALAPATI VENKATESH | 8 | PASS |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR | 9 | PASS |

**LIST OF STUDENTS UNDER – SLOW LEARNERS (<41 %TO 59%) IN M1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** | **Final Examination result** |
| 3 | Y15EE1209 | CHENNUPATI KALYANI | 9 | PASS |
| 7 | Y15EE1220 | NANDIGAM DIVYA | 10 | PASS |
| 12 | Y15EE1202 | ANKAM RAJESH | 10 | PASS |
| 13 | L16EE1228 | ANKAMSETTI NAGA RAJU | 7 | PASS |
| 15 | Y15EE1205 | BELLAM GOPI | 9 | PASS |
| 17 | Y15EE1208 | BOMMISETTI GOPI | 10 | PASS |
| 18 | L16EE1229 | BONAM SRINIVASA REDDY | 7 | PASS |
| 24 | Y15EE1211 | GONDI SAI PRAKASH | 7 | PASS |
| 25 | Y15EE1213 | JILLELLA ANVESH | 8 | PASS |
| 31 | L16EE1236 | PALAPARTHI VINOD KUMAR | 7 | PASS |
| 37 | L16EE1241 | THODETI RAVI TEJA | 9 | PASS |
| 39 | L16EE1242 | UPPALAPATI VENKATESH | 7 | PASS |
| 40 | L16EE1243 | VELLABATI SUNIL KUMAR | 7 | PASS |

**LIST OF STUDENTS UNDER –** **MEDIUM LEARNERS (>60% TO <84%) IN M1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R No** | **Reg.No** | **Name of the Student** | **Obtained Marks** | **Final Examination result** |
| 5 | Y15EE1216 | KOMMINENI SRI DEEPTHI | 11 | PASS |
| 6 | Y15EE1219 | MUTHYALA TEJA SRI | 12 | PASS |
| 20 | L16EE1231 | CHEEMAKURTHI VEERA VENKATA NAGA YASWANTH | 15 | PASS |
| 26 | Y15EE1214 | KAILA MADHUBABU | 12 | PASS |
| 32 | L16EE1237 | PATHARLAPALLI SAI KUMAR | 13 | PASS |
| 34 | L16EE1238 | RAVURI PRAVEEN | 12 | PASS |
| 38 | Y15EE1226 | TUMMALA GOPALA REDDY | 15 | PASS |





**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Result Analysis at the End of Course**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **YEAR** | **STAFF MEMBER** | **O** | **A+** | **A** | **B+** | **B** | **C** | **D** | **F** | **W** | **Appeared** | **Passed** | **Pass %** |
| 1 | 2019-20 | Mr.K.Saidarao | 2 | 6 | 4 | 11 | 10 | 2 | 4 | 1 | 0 | 40 | 39 | 98% |

**GRADES: >=90%--O, 80%to89%--A+, 70%to79%--A, 60%to69%--B+, 50%to59%--B, 45%to49%,--C, 40% to 44%,--D, <=39%--F and W for absent**

|  |  |
| --- | --- |
| **Mid-I Results** | |
| No of Students in Below Target Level | No of Students in Above Target Level |
| 19 | 18 |

|  |  |
| --- | --- |
| **Mid-II Results** | |
| No of Students in Below Target Level | No of Students in Above Target Level |
| 11 | 29 |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**Result Analysis**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **YEAR** | **STAFF MEMBER** | **O** | **A+** | **A** | **B+** | **B** | **C** | **D** | **F** | **W** | **Appeared** | **Passed** | **Pass %** |
| 1 | 2019-20 | Mr.K.Saidarao | 2 | 6 | 4 | 11 | 10 | 2 | 4 | 1 | 0 | 40 | 39 | 98% |

**GRADES: >=90%--O, 80%to89%--A+, 70%to79%--A, 60%to69%--B+, 50%to59%--B, 45%to49%,--C, 40% to 44%,--D, <=39%--F and W for absent**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **YEAR** | **STAFF MEMBER** | **S** | **A** | **B** | **C** | **D** | **E** | **F** | **W** | **Appeared** | **Passed** | **Pass %** |
| 1 | 2016-17 | Mr.K.Murali Krishna Raju | - | - | 3 | 5 | 1 | - | 1 | 0 | 10 | 9 | 90 |
| 2 | 2015-16 | Mr.P.Ramesh Babu | 1 | 1 | 2 | 5 | 6 | 0 | 3 | 0 | 18 | 15 | 83.33 |
| 3 | 2014-15 | Mr. J.Syam Kumar | 1 | 0 | 4 | 4 | 5 | 0 | 4 | 0 | 18 | 14 | 77.77 |
| 4 | 2013-14 | Mr.A Pavan Kumar | 1 | 3 | 2 | 3 | 7 | 6 | 7 | 1 | 29 | 22 | 75.8 |

**GRADES: >=85%--s, 75%to84%--A, 65%to74%--B, 55%to64%--C,**

**45%to54%--D, 40%to44%,--E, <=39%--F and W for absent**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **YEAR** | **STAFF MEMBER** | **70-60** | **59-50** | **49-40** | **39-28** | **Fail** | **Absent** | **Highest** | **Appeared** | **Passed** | **Pass %** |
| 4 | 2012-13 | Mr.G.veera Bhadra Chary | 1 | 4 | 20 | 19 | 6 | 0 | 60 | 50 | 44 | 88 |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**ADVANCED LEARNERS A-1 (>85%)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R.No** | **Reg.No** | **Name of the Student** | **Activity** | **Date** |
| 2 | Y15EE1207 | BOGINENI PRIYANKA | SEMINAR ON CONSTRUCTIONAL DETAILS OF SYNCHRONOUS MACHINES | 25-Sep-2017 |
| 10 | Y15EE1224 | SHAIK GOUSE BI |
| 19 | L16EE1230 | BRUNDAVANAM SASANK VENKATAKRISHNA SAI |
| 21 | L16EE1232 | CHENNURU DHANUNJAYA |
| 26 | Y15EE1214 | KAILA MADHUBABU | SEMINAR ON DIFFERENT TYPES OF VOLTAGE REGULATION OF SYNCHRONOUS MACHINES | 16-Oct-2017 |
| 34 | L16EE1238 | RAVURI PRAVEEN |
| 36 | L16EE1240 | TADAKALURU SREEKANTH |

**ADVANCED LEARNERS M-1 (>85%)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **R.No** | **Reg.No** | **Name of the Student** | **Activity** | **Date** |
| 2 | Y15EE1207 | BOGINENI PRIYANKA | Prepare PPT on Different Types of Special Electrical Machines | 23-Oct-2017 |
| 10 | Y15EE1224 | SHAIK GOUSE BI |
| 19 | L16EE1230 | BRUNDAVANAM SASANK VENKATAKRISHNA SAI |
| 21 | L16EE1232 | CHENNURU DHANUNJAYA |
| 22 | L16EE1233 | CHERUKURI ANANDA BABU | Seminar on Applications of Special Electrical Machines | 30-Oct-2017 |
| 30 | L16EE1235 | NALLABOTHU PREMNATH |
| 33 | Y15EE1223 | PUTTA BHARGAV MEHER REDDY |
| 36 | L16EE1240 | TADAKALURU SREEKANTH |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**REMEDIAL ACTION TAKEN**

|  |  |  |  |
| --- | --- | --- | --- |
| **R.No** | **Reg No** | **Action Taken** | **Signature of student** |
| 9 | Y15EE1221 | Previous Question paper discussed, Brief explanation of Different types of Synchronous machines, and Solved Problems on Voltage Regulation , refer to text book some important Topics |  |

Signature of Faculty

(Mr.G.Satish)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**Subject: – NEW & RENEWABLE ENERGY SOURCES (EE-415)**

|  |  |  |
| --- | --- | --- |
| Faculty Name: Mr.G. SATISH | Year / Sem: B.Tech in EEE - IV/I | Academic Year: 2019-20 |

**CO-PO/PSO ATTAINMENT**

|  |  |
| --- | --- |
| **C316**.**1** | Understand the Construction, Working principle of operation of three phase Synchronous Generator and analyse the methods of determining the Voltage Regulation. **(Synthesis)** |
| **C316**.**2** | Understand the specifications of synchronous generators and are able to solve problems involving synchronous machines operating alone or in parallel. **(Application)** |
| **C316**.**3** | Comprehend the Three phase synchronous Motor operation, Characteristics, Performance and Applications. **(Synthesis)** |
| **C316**.**4** | Gain knowledge in principle of working, specifications and applications of universal motor and single phase ac series motor, BLDC motor. (**Knowledge)** |
| **C316**.**5** | Gain knowledge in principle of operation, Construction and characteristics of Single Phase Synchronous Motors, Stepper Motors and Liner Induction Motor. **(Knowledge)** |

**Mapping on CO’s to PO**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **C316.1** | 3 | 2 | 1 | - | - | - | - | - | - |  | - | 1 |
| **C316.2** | 2 | 3 | 1 | - | - | - | - | - | - |  | - | 1 |
| **C316.3** | 2 | 1 | 3 |  | - | - | - | - | - |  | - | 1 |
| **C316.4** | 3 | 1 | 2 |  | 1 |  |  |  |  |  |  | 1 |
| **C316.5** | 3 | 1 | 2 |  | 1 |  |  |  |  |  |  | 1 |
| **C316** | 2.6 | 1.6 | 1.8 |  | 1 |  |  |  |  |  |  | 1 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO** | ATTAINMENT | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **C316** | **2** | **1.7** | **1** | **1.2** |  | **0.8** |  |  |  |  |  |  | **0.8** |