Andhra Loyola Institute of Engineering and Technology

Teacher/Instructor: Mr. P.Sugandha Kumar, Assistant Professor of Chemistry

Lesson plan for a Day

Term/Semester/Year: AY: 2021-22/ SEM-I

Main Objectives

- Learn the importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- To enhance students knowledge on wide variety of advanced materials, which have excellent engineering properties.
- To develop the students as professional engineers later in design and material selection, as well as utilizing the available resources.
- To enhance students knowledge on alternative sources of power and advanced instrumental techniques.

Unit I Polymer technology:

Contents/Activities – Unit I:

1	Factual	Students should be able to learn some polymers and structures of some chemical compounds.
2	Conceptual	Students come to know the mechanism and the chemical reactions involved in the preparation of plastics and elastomers
3	Procedural	Based on the functional groups involved students come to know properties of polymers
4	Applied	Based on the properties of polymers manufacturing of various engineering materials

Schedule and Sequence: Day Plan for Unit I – Polymer Technology:

Unit I : Total classes – 12

Session/week/ Module -1 Total Classes -12	Topic	Objectives	Before Class - Videos, e-Books, Case studies	In-Class – Activities, Quiz	Post Class Assignmet, Discussion Forum
Day-1	Unit I: Introduction to Polymer Technology	To learn the importance of usage of plastics in household appliances.	https://www.youtube.com/watch?v=p6QPFKwylnU	Importance of polymers in day to day life (20 Min) Definitions of polymer, monomer, polymerisation -(40 Min) https://www.youtube.com/watch?v=icj_5yF-GV8	Learning outcome – To understand the basics of polymers. To understand the terms in polymerisation.
Day-2	Methods of polymerisation	To learn polymer forming process	https://www.sciencedirect.com/topics/engineering/polymerization-method	Process of suspension polymerisation (30 min) and Emulsion polymerisation. (30 min)https://www.youtube.com/watch?v=fMGHlLcTjOw	Learning outcome – Students should be able to understand the polymerisation techniques and its advantages
Day -3	Physical and mechanical properties of polymers	To known the various properties of polymers	https://textilestudycenter.com/physical-properties-of-polymers/	Physical properties of polymers. (40 min) Mechanical properties of polymers (20 min) https://www.youtube.com/watch?v=ZpIQzna0k2Q	Students understand physical and mechanical properties of polymers by group discussion.
Day – 4	Introduction to plastics	To make the students	Flow chat of compounding	Explaining each ingredient added	Assignment on functions of

	and compounding of plastics	understand the various ingredients added in the compounding of plastics.	of plastics	in the compounding and its role with examples (40 mim) Learners Response (20 min)https://www.youtube.com/watch?v=d4kX5pRyQ0A	various ingredients in the compounding of plastics.
Day- 5	Methods of fabrication of Plastics.	Students get the idea of various moulding machines	moulding machines for easy understanding. https://www.youtube.com/watch?v=cVsRX0jnsqE	Compression moulding (30 min) Injection moulding (30 min)https://www.youtube.com/watch?v=cVsRX0jnsqE	Practice the diagrams of moulding of plastics.
Day -6	Methods of fabrication of Plastics.	Students get the idea of various moulding machines	Animated moulding machines for easy understanding. https://www.youtube.com/watch?v=W6V0w-ajtN8 andhttps://www.youtube.com/watch?v=zcBv_JvFDBI	Blown film moulding (30 min) Extrusion moulding (30 min) https://www.youtube.com/watch?v=W6V0w-ajtN8 andhttps://www.youtube.com/watch?v=zcBv_JvFDBI	Practice the diagrams of moulding of plastics.
Day-7	Preparation, properties and	Students learn the preparation equations	Structures of few organic compoun	PVC (10 min) Polycarbonates(20 min) Bakelite (30	Practice the structures of monomers and equations of

	applications of PVC, Polycarbonate Bakelite	of polymers, and their utilization in the day to day life	ds.	min) https://www.youtube.com/watch?v=17XqecEs7M8	polymers
Day -8	Some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.	Students come to know usage of plastics in electronic devices. Various steps involved in the recycling of e- plastic waste	Some examples of polymers	Some examples of plastic materials used in electronic gadgets (20 min) Recycling of e-plastic waste.(40 min) https://www.youtube.com/watch?v=ejB6NDIwdXo	Students understand process of recyclicing of e plastic waste by group discussion
Day -9	Elastomers	Students will understand the processing of Natural rubber from rubber trees	**Video of processing of natural rubber https://www.youtube.com/watch?v=5iTz9yN4v4k**	Natural ruuber and its structure (10 min) Drawbacks of natural rubber(10 min) Vulcanisation of rubber (40 min) **https://www.youtube.com/watch?v=5iTz9yN4v4k**	Assignment on structure of natural rubber. Practice the equation of rubber with sulphur
Day -10	Preparation, properties and applications of Buna –s, Thiokol, Polyurethane	Students learn the preparation equations of polymers, and their utilization in the day to day life	Structures of few organic compounds.	Buna -s (20 min) Thiokol (20 min) Polyurethane (20 min) https://www.youtube.com/watch?v=wxMqqrkybkA	Practice the structures of monomers and equations of polymers
Day -11	Composite materials	Students get the knowledge of bullet proof plastics and	Few examples of Fibre reinforced plastics and their	CFRP (10 min) GFRP(10 min) Bullet proof plastics(10 min) Conducting polymers (30	Practice the structures of polymers

		Conducting polymers	usage in various fields	min) https://www.youtube.com/watch?v=S96zHUSxZc0	
Day -12	Biodegradable polymers, Bio polymers, Biomedical polymers.	Students come to know the plastics which are biodegradable and environmentally safe.	Examples of Plastics used in medical field	Biodegradable plastics (20 min) Bio polymers (20 min) Biomedical polymers. (20 min) https://www.youtube.com/watch?v=I5SEa-wpoQU	Students understand concept of biodegradable polymers by group discussion

Unit II Electrochemical Cells and Corrosion:
Contents/Activities – Unit II:

1	Factual	Students should be able to remember terms like anode, cathode, oxidation, reduction and metals and their electronic configurations
2	Conceptual	Students come to understand redox reactions.
3	Procedural	Students should be able to know construction of batteries and their working and calomel electrode and Hydrogen electrode.
4	Applied	Determination of pH and H^+ ion concentration using electrode. Generation of electricity using batteries.

Schedule and Sequence: Day Plan for Unit II – Electrochemical Cells and Corrosion:

Unit II : Total classes – 12

Session/week/ Module -2 Total Classes -12	Topic	Objectives	Before Class - Videos, e-Books, Case studies	In-Class – Activities, Quiz	Post Class Assignmet, Discussion Forum

Day -13	ELECTROCHEMICAL CELLS AND CORROSION Single electrode potential-	Students come to basic information of electrochemistry and definition of terms	Jain and jain	Introduction 20 min, and definition 20 min and potential of metals 10 min https://www.youtube.com/watch?v=ouFBTT-SDHE	Assignment on single electrode potential
Day -14	Electrochemical series and uses of series-standard hydrogen electrode, calomel electrode.	Student come to know how metals are arranged in order by Pot.diff and working and construction of reference electrodes	Jain and jain	Series 15 min, Hydrogen and calomel for 30 min with live examples https://www.youtube.com/watch?v=8hvnqgN8cYg	Functioning of electrodes for analysis
Day -15	concentration cell-construction of glass electrode	Students come to know generation of electricity by difference in concentration of half cells	Jain and Jain	Explanation 20 min and video 5min, examples 15 min https://www.youtube.com/watch?v=Vuh-HRkgdKQ	Assignment on glass electrode
Day -16	Batteries: Dry cell, Ni-Cd cells, Ni-Metal hydride cells	Student come to kow primary batteries and their working	Jain and jain	Primary batteries 25min, and Ni-Cd battery for 20 min https://www.youtube.com/watch?v=dGOQNEqX_Vw	Students understand different types of Ni-Cd, Ni-Metal hydride cells by group discussion
Day -17	Li ion battery, zinc air cells–Fuel cells: H2-O2	Student come to know advanced batteries construction and working	NPTEL https://www.youtube.com/watch?v=no4vRKvKxcU&list=PL0TXEHZ7r9DJ6e5Rv4	video and lecture for 40 min https://www.youtube.com/watch?v=no4vRKvKxcU&list=PL0TXEHZ7r9DJ6e5Rv4tJf	Students understand different types of Li ion and H2-O2 cells by group discussion

			tJfB05TxbOxSC_Q	B05TxbOxSC_Q fuel cell introduction for 10 min	
Day -18	CH3OH-O2, phosphoric acid, molten carbonate	Student come to know various fuel cell and their construction and working with applications	https://www.youtube.com/watch?v=lUhLJnDspw4 and https://www.youtube.com/watch?v=qwsmQ5DyEhk	Explanation for 3o min with https://www.youtube.com/watch?v=lUhLJnDspw4 and https://www.youtube.com/watch?v=qwsmQ5DyEhk molten carbonate-15 min	Students understand different types of PAMC cells by group discussion
Day -19	*Corrosion:*-Definition-theories of corrosion (chemical and electrochemical)-	Student come to know how surrounding s effect the metals	NPTEL https://www.youtube.com/watch?v=xmB2gtvvhTw&list=PLFW6lRTa1g81kobA2tvZ84YHB2li6qwx7&index=3jain and jain	Introduction for 10 min, and theories of corrosion and classification -40 min	Assignment on theories of corrosion
Day -20	Galvanic corrosion, differential aeration corrosion, stress corrosion, waterline corrosion-passivity of metals-	Students come to know different types of corrosion for various metals	NPTEL https://www.youtube.com/watch?v=LxtDvKOca9w&list=PLFW6lRTa1g81kobA2tvZ84YHB2li6qwx7&index=4	Explanation with examples 40 min	Group discussion on different case studies among the students
Day -21	Galvanic series-factors influencing rate of corrosion-	Student come to know which various factors	Jain and jain	Various factors effecting 45 min https://www.youtube.com/w	Assignment on factors effecting rate of corrosion

		effecting the rate of corrosion		atch?v=LfLqqXy9UD4	
Day -22	corrosion control (proper designing, cathodic protection)	Come to know different corrosion control methods for different metals by using other metals	NPTEL https://www.youtube.com/watch?v=-ElKyoy9ZaM	Proper designing-10 min, cathodic protection- 30 min https://www.youtube.com/watch?v=-ElKyoy9ZaM	Students understand different methods of controlling rate of corrosion by group discussion
Day -23	Protective coatings: Surface preparation, cathodic and anodic coatings	How to coat metals with other metals after proper surface cleaning methods	Jain and jainhttps://www.youtube.com/watch?v=WuKIr0OQXXU	Surface preparation-15 min, cathodic and anodic coating for 30 min	Assignment on protective coatings
Day -24	electroplating, electroless plating (nickel). Paints (constituents, functions, special paints)	Student come to know how metals coating with other metals with and without curret	https://www.youtube.com/watch?v=lfT9L3ADkZw	Explanation 50 min	Students understand different types of protective coatings by group discussion

Unit III Material Chemistry:

Contents/Activities – Unit III:

1	Factual	Students come to know P block elements in the periodic table with semi conducting properties and definitions of conductors, semi conductors, super conductors and insulators.
2	Conceptual	Students come to know about the characterization techniques of nano materials by BET, TEM and SEM methods
3	Procedural	Students should be able to know preparation of of nano materials by using different carbon sources and energy sources. Preparation of semi conductors and their properties.
4	Applied	Based on the properties of nano materials and semiconducting materials students can apply these in various engineering fields.

Schedule and Sequence: Day Plan for Unit III – Material Chemistry:

Unit III : Total classes – 12

Session /w eek/ Module -3 Total Classes -12	Topic	Objectives	Before Class - Videos, e-Books, Case studies	In-Class – Activities, Quiz	Post Class Assignmet, Discussion Forum
Day -25	MATERIAL CHEMISTRY Part I: Non-elemental semiconductin g materialsStoich iometric, controlled valency& chalcogen semiconductors	Student come to know semiconductin g materials, types and their classification with examples	Text book	Semiconductor s and classification based on purity with examples 20 min, controlled valency 15 min, chalcogen semiconductor s 15 min. https://www.yo utube.com/wat ch?v=osVWV9 RI9Ag	Assignment on the Chalcogen semiconductors
Day -26	photo/semicon ductors-prepar ation of semiconductor s (distillation, zone refining	Student come to know various methods of preparation of semiconductor s based on element	https://www.yo utube.com/watc h?v=ZAYAe_Oi mlo	Zone refiing for 15 min, https://www.yo utube.com/wat ch?v=ZAYAe_ Oimlo	Assignment on Distillation, zone refining
Day -27	Czochralski crystal pulling, epitaxy, diffusion, ion implantation)	Student come to know new methods of preparation in semicoductors	https://www.s ciencedirect.c om/topics/che mistry/czochr alski-process	https://www.yo utube.com/wat ch?v=xftnhfa- Dmo video for 10 min, epitaxy 10 min, diffusion and ion implanation 15 min.	Assignment on Czochralski crystal pulling mehtod
Day -28	Semiconduct or devices (p-n junction diode, diode as rectifier, junction	Student come to know construction and working of p-n junction diode and	https://self studypoint .in/pn-jun ction-diod e-rectifier/		Group discussion on various examples of diodes and semiconductors

	transistor).	applications			
Day -29	*Insulators & magnetic materials:* electrical insulators-ferro and ferri magnetism	.student able to understand liquid crystals and superconductors	https://www.youtube.com/watch?v=C0ZKDSa9uJQ	Revision 15 min, Explanation of insulators with examples 30 min	Students understand different types of electrical insulators by group discussion
Day -30	Hall effect and its applications.	Student understand geeratio of volatage using current carrying conductors	https://www.elprocus.com/hall-effect-theory-and-its-applications/	Revision 10 min, and quiz 20 min, Hall effect explanation 20 min	Group discussion on applications of Hall effect
Day -31	Part II:*Nano materials:-* Introduction-sol-gel method	The students would be now aware of materials like nano-materials and their approaches		Introduction for 20 min, sol-gel method 20 min, examples 10 min https://www.youtube.com/watch?v=bpV2u9eXQSE	Assignment on preparation of nano meterials
Day -32	characterization by BET, SEM and TEM methods	Preparation of nano materials and chracterization	https://www.researchgate.net/publication/232932155_The_Preparation_of_Carbon_Nanotubes	BET method for 20 min, TEM method for 15 min, SEM for 15min.	Assignment on BET, TEM methods
Day -33	applications of graphene-carbon nanotubes and fullerenes	The students would be now aware of materials like nano-materials and fullerenes and their uses	Jain and jain	Various application in various fields for 15 min, https://www.youtube.com/watch?v=pHGCjL6mz_A	Group discussion on applications of CNTs.
Day -34	Types, preparation and applications of CNT'S	Preparation of CNT by using various energy and carbon sources	Arc https://www.youtube.com/watch?v=7WGZq1EY6no , animation of CVD	Preparation 40 min….application 30 min	Assignment on types and preparation of CNTs

			https://www.youtube.com/watch?v=hkYb35e5JGo Laser ablation https://www.youtube.com/watch?v=JL8qvTW-WCg		
Day -35	*Liquid crystals:-Introduction-types-applications.*	Student able to understand thatcontrolling the arrangement of molecules, an image in light can be produced and manipulated	https://www.youtube.com/watch?v=qnDuNu6d54I	Video on liq crystals https://www.youtube.com/watch?v=MuWDwVHVLio for 10 min, types for 40 min	The students are exposed to some of the alternative fuels and their advantages and limitations
Day -36	*Super conductors:*-Type –I, Type II-characteristics and applications	Student able to understand the advanced materials (superconductors) and engineering properties	https://physics.stackexchange.com/questions/150850/what-is-the-difference-between-a-type-1-and-a-type-2-superconductor and https://www.youtube.com/watch?v=AWgGgLfvsqo	Types 20 min, characteristics 10 min, application 10 min	Group discussion on applications of super conductors

Unit IV ADVANCED CONCEPTS/TOPICS IN CHEMISTRY:

1	Factual	Students should be able to learn definitions of computational chemistry and molecular motor switches
2	Conceptual	Students come to know a method of programming computer science to solve chemical problems. Structures of some molecular machines and how these play an important role in human body.
3	Procedural	Working of molecular machines by using acid base reagents and generation of artificial molecular motors and machines.
4	Applied	Importance of molecular machine in human metabolism

Schedule and Sequence: Day Plan for Unit IV: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY:

Unit IV : Total classes – 8

Session/week/ Module -4 Total Classes -8	Topic	Objectives	Before Class - Videos, e-Books, Case studies	In-Class – Activities, Quiz	Post Class Assignmet, Discussion Forum
Day -37	ADVANCED CONCEPTS/TOPICS IN CHEMISTRY *Computational chemistry*: Introduction	Student able to understand the basic computational chemistry	https://www.youtube.com/watch?v=najTlj2_lN8&list=PLOzRYVm0a65fCJJQendwEEcSrC8iwvgBn	Introduction and uses for 30 min, Video for 20 min	Assignment on computational chemistry
Day -38	Ab Initio studies		ab-initio https://www.youtube.com/watch?v=yzVT3snGKD4	Revision class for 10 min, video with explanation 30 min,	Assignment on Ab Initio method
Day -39	*Molecular switches*: characteristics of molecular motors and machines,	Student come to know about essential tasks like movement and energy conversion in living organism by molecular machines	Text book https://www.youtube.com/watch?v=Z_l5Xr1G_Sw	Introduction 15 min, definition and expalation of molecular machies and switches for 25 min,	Discussion on characterstics of molecular machines

Day -40	Rotaxanes	Student come to know Energy conversion, transport and regulating functions of artificial molecular machines	https://www.youtube.com/watch?v=BWNK-0CjDso	Revision class 10min, video 15 min https://www.youtube.com/watch?v=Y6yzMczJ3mQ&t=41s	Assignment on Rotaxanes
Day -41	Catenanes as artificial molecular machines	Student come to know mechanical activity of catenanes	Applied chemistry by Cengage	Video for 15 min https://www.youtube.com/watch?v=DcQ5kZNEziI	Assignment on Catenanes as artificial molecular machines
Day -42	prototypes – linear motions in rotaxanes,	Understand about how linear motion in rotaxanes by catalyst	https://www.youtube.com/watch?v=ZS4HetJRV-Y	Revision class 10min, Prototypes 15 min, Linear motion in rotaxens 20 min.	Discussion on Linear motions in rotaxanes
Day -43	an acid-base controlled molecular shuttle	Student able to understand the effect of PH on molecular shuttle	https://www.youtube.com/watch?v=ZS4HetJRV-Y	Revision 10 min, Explanation 30 min,	Assignment on acid-base controlled molecular shuttle
Day -44	a molecular elevator,	Student able to know importance of molecular elevators and powered molecular motors	https://www.youtube.com/watch?v=X_tYrnv_o6A&t=302s	Explanation for molecular elevators 20 min, and autonomous power of MM 20 min,	Discussion on molecular elevator

Unit V : Spectroscopic techniques & non-conventional energy sources

1	Factual	Students should be able to remember different electromagnetic radiations and their wave lengths, frequencies and energy sources
2	Conceptual	Students come to know the principles of UV, IR,and NMR. Principle of photo voltaic cell.
3	Procedural	Students able to know Instrumentation of UV, IR and working of PV cell.
4	Applied	Students should be able to study chemical structures based on wavelength and frequencies.

Schedule and Sequence: Day Plan for Unit V: Spectroscopic techniques & non-conventional energy sources :

Unit V : Total classes – 16

Session/week/ Module -5 Total Classes -16	Topic	Objectives	Before Class - Videos, e-Books, Case studies	In-Class – Activities, Quiz	Post Class Assignmet, Discussion Forum
Day -45	Unit v: Spectroscopic techniques & non-conventional energy sources PART A: Spectroscopic Techniques	Student come to know interaction of matter with EM radiation	Jagmohan text book	Introduction :20min, min, techniques 20 min https://www.youtube.com/watch?v=dkARLSQWHH8	Assignment on Spectroscopic techinques
Day -46	Electromagnetic spectrum-UV	Student understand different wavelength in EMR	Jagmohan text book	Explanation 30 min, Animation https://www.youtube.com/watch?v=FWCN_uI5ygY	Discussion on Electro magnetic spectrum
Day -47	laws of absorption,	Student able to understan	https://www.youtube.c	Revision 10 min, Explanation 30 min	Assignment on laws of absorption

		d Beer-Lamberts law	om/watch?v=0fBSBG8f6VU		
Day -48	Instrumentation, theory of electronic spectroscopy,	Student come to know construction and working of UV-Visible instrument	Jag mohan text book https://www.youtube.com/watch?v=tbUx-RaZS7M	Instrumentation video and explanation 30 min	Discussion on electronic spectroscopy
Day -49	Franck-condon principle, chromophores and auxochromes ,intensity shifts,	Student able to understand principle involved in electronic transitions	Jag mohan text book	Franck –condon principle 20 min, Chromophore and auxochromes 30 min https://www.youtube.com/watch?v=kyUDgIQ-Y1A	Assignment on Franck-condon principle
Day -50	Applications, FT-IR	Student come to know applications of uv in drug era	https://microbenotes.com/uv-spectroscopy-principle-instrumentation-applications/	https://microbenotes.com/uv-spectroscopy-principle-instrumentation-applications/	Discussion on applications of FT-IR
Day -51	Instrumentation of IR	Working and construction of IR spectroscopy	https://www.youtube.com/watch?v=OiukFtC8E04	Revision 10 min, Explanation of IR instrumentation for 30 min,	Assignment on instrumentation of IR
Day -52	IR frequency of some functional groups	Student able to understand the differences of each functional	Jagmohan text book	Explanation individual functional groups https://www.youtube.com/watch?v=UHs7mO-iy_c	Discussion on various IR frequencies of functional groups

		group with frequency difference			
Day -53	IR of some organic compounds, applications)	Student able to understand the identification of compound by IR frequencies	Jagmohan text book	Explanation of frequency's of some organic compounds	Assignment on applications of IR
Day -54	Magnetic resonance imaging	Student able to understand construction , working and principle of MRI	https://www2.cs.sfu.ca/~stella/papers/blairthesis/main/node11.html https://www.youtube.com/watch?v=kmfmGhI8l9E	https://www.youtube.com/watch?v=kmfmGhI8l9E	Discussion on MRI
Day -55	CT scan (procedure & applications).	Student able to understand construction , working and principle of MRI	https://teachmeanatomy.info/the-basics/imaging/computed-tomography-ct-scans/ https://www.youtube.c	Construction and working of CT scan 25 min, animation 10 min, https://www.youtube.com/watch?v=l9swbAtRRbg	Discussion on applications of CT scan

			om/watch?v=l9swbAtRRbg		
Day -56	Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell	Student able to understand construction , working and principle of photovoltaic cell	https://www.electrical4u.com/working-principle-of-photovoltaic-cell-or-solar-cell/	Introduction : 5 min. Design : 10min. Schematic diagram: 5min. Construction and Working : 25min. Advantages and disadvantages : 5min. https://www.youtube.com/watch?v=sXcsKzJylrA	Assignment on case study that students come across in their daily life.
Day -57	Design, working, schematic diagram, advantages and disadvantages of hydropower	Student able to inculicate the usage of hydropower	https://en.wikipedia.org/wiki/Hydropower#:~:text=Hydropower%20or%20water%20power%20(from,be%20harnessed%20for%20useful%20purposes.	Introduction : 5 min. Design : 10min. Schematic diagram: 5min. Construction and Working : 25min. Advantages and disadvantages : 5min. https://www.youtube.com/watch?v=Uhjhufhg3Xk	Group discussion on hydropower plants in different terestial places.
Day -58	Design, working, schematic diagram, advantages and disadvantages of geothermal power	Student able to understand the importance of geothermal power	https://www.power-technology.com/features/what-is-geothermal-energy/	Introduction : 5 min. Design : 10min. Schematic diagram: 5min. Construction and Working : 25min. Advantages and disadvantages : 5min. https://www.youtube.com/watch?v=eyOXmqu4PS8	Students are exposed to learn concept of geo themal enery
Day -59	Design, working, schematic diagram, advantages	Student able to understand the detailed concept of	https://www.power-technology.com/features/tidal-energy-advantages-an	Introduction : 5 min. Design : 10min. Schematic diagram: 5min.	Assignment on example of tidal and wave power

	and disadvantages of tidal and wave power	tidal and wave power	d-disadvantages/	Construction and Working : 25min. Advantages and disadvantages : 5min.https://www.youtube.com/watch?v=2U4_p3AjoKo	
Day -60	Design, working, schematic diagram, advantages and disadvantages of ocean thermal energy conversion	Student able to get complete knowledge on ocean thermal energy conversion	https://www.sciencedirect.com/topics/engineering/ocean-thermal-energy-conversion	Introduction : 5 min. Design : 10min. Schematic diagram: 5min. Construction and Working : 25min. Advantages and disadvantages : 5min. https://www.youtube.com/watch?v=B9bfqeGoGZI	Group discussion on ocean thermal energy conversion