Imprints Private Limited, 2006.

Unit - V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER- II			
CORE II	**Thermal Physics And Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objective:

1. To gain knowledge about the laws of thermodynamics
2. To understand the concept of transport phenomena and thermal conductivity
3. To provide a solid understanding of low temperature physics and optical phenomena
4. To know the spectacular nature of light by studying interference, diffraction and polarisation

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laws of thermodynamics understand the concepts of transport phenomenon	1 1	**U** **U**
CO-2	understand the transfer of energy through conduction, convection and radiation	1	**U**
CO-3	demonstrate the experiment regarding the measurement of thermal conductivity and specific capacity. Calculate the thermal conductivity of a bad conductor	1 2, 4, 6	**U** **E**
CO-4	understand the low temperature physics, concerned with the behaviour of matter in the temperature regime where quantum effects are dominated	1	**U**
CO-5	create an interest in field of research in low temperature physics	1	**C**
CO-6	learn about the dispersion through a prism. determine the refractive index and dispersive power of the material of the prism	1 2, 4, 6	**U** **E**
CO-7	define the different types of aberrations in lenses and discuss the methods to reduce them	1	**R, U**
CO-8	describe the phenomenon of interference and colours of thin films. calculate the thickness of a thin wire by forming interference fringes	1 2, 4, 6	**U** **E**
CO-9	evaluate the dispersive power and resolving power of a grating and demonstrate experiments with a grating and	2, 4, 6	**E, An**

	find the wavelengths of the light used		
CO-10	acquire knowledge of the polarisation of light and its changes upon reflection and transmission	1	**U**

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Unit I: Laws of thermodynamics and Transport Phenomena

Zeroth law of thermodynamics – first law of thermodynamics – isothermal change – adiabatic change – heat engine – expression for the efficiency of a Carnot's engine – Carnot's cycle as refrigerator – reversible and irreversible process – second law of thermodynamics — entropy – change in entropy in reversible and irreversible process – temperature-entropy diagram – third law of thermodynamics – mean free path - transport phenomena - expression for the viscosity of a gas – expression for thermal conductivity of a gases – expression for the coefficient of diffusion

Unit II: Transfer of heat and low temperature physics

Conduction, convection and radiation – conduction of heat – Lee's Disc's method of determining K of a bad conductor – convection of heat – Newton's law of cooling by convection –experimental verification of Newton's law of cooling –the Joule Porous plug experiment – relation between inversion, Boyle and critical temperatures – adiabatic demagnetization – theory and experimental setup.

Unit III: Dispersion and Aberrations

Dispersion through a prism – angular dispersion – dispersive power – achromatism in prisms – deviation without dispersion – dispersion without deviation – direct vision spectroscope – constant deviation prism – constant deviation spectroscope – spherical aberration in lenses – methods of minimizing spherical aberration – condition for minimum spherical aberration of two thin lenses separated by a distance – aplanatic lens – chromatic aberration in lenses – condition for achromatism of two thin lenses in contact – coma.

Unit IV: Interference and Diffraction

Interference – conditions for sustained interference – interference by reflected systems – production of colours in thin films– air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Newton's rings – determination of wavelength of sodium light by Newton's rings – determination of refractive index of a liquid by Newton's rings.

Fresnel's diffraction – half period zones – zone plate – multiple foci in a zone plate – comparison of zone plate with a convex lens – Fraunhofer diffraction – plane transmission

diffraction grating – grating at normal incidence –determination of wavelength of light by normal incidence method and minimum deviation method– dispersive power of grating –grating at oblique incidence – resolving power of optical instruments – Rayleigh's criterion for resolution – resolving power of a grating.

Unit V: Polarisation

polarisation of light – double refraction – Nicol prism – polarizer and analyzer – quarter wave plate and half wave plate – plane, elliptically and circularly polarized light:production and detection – optical activity – Fresnel's theory of optical activity – experimental verification of Fresnel's theory – specific rotation – Laurent's half shade polarimeter.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication.
2. Murugeshan R. *Thermal Physics and Geometrical Optics*.
3. Murugeshan Kiruthiga Sivaprasath R. *Optics and Spectroscopy*. S. Chand & Company Ltd. Revised edition 2014.

Books for Reference:

1. Gupta B. and Roy H.P. *Thermal Physics*. Books and Allied (P) Ltd., Second edition 2005.
2. Brijlal and Subramanyam N. *Heat and thermodynamics*, S. Chand & Co. Ltd. 2005.
3. Arunabhasen and Gupta A. B. *College Physics.* volume I. Books and Allied (P) Ltd. 2005.
4. Brijlal and Subramanyam N. *Optics*. S. Chand & Co. Revised by M.N. Avadhanulu. 23rd revised edition 2006.

SEMESTER- I			
Professional English For Physics – I			
Course Code: 21UPHPE1	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objectives:

1. To gain knowledge regarding competence in speaking and reading correct English.
2. To know the importance of English in professional life.
3. To improve the writing skills.

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recognize their own ability to improve their own competence in using the language	**1,3**	**R**
CO-2	use language for speaking with confidence in an intelligible and acceptable manner	1,4	**U**
CO-3	understand the importance of reading for life	1,6,4	**U**
CO-4	read independently unfamiliar texts with comprehension	1,2	**U, An**
CO-5	understand the importance of writing in academic life	1, 2	**U**
CO-6	draw flowcharts and mind maps	5	**Re**
CO-7	apply their own ability to improve their own competence in using the language	5	**Ap**
CO-8	outline the importance of writing in academic life (K4)	5	**An**

SEMESTER- I			
Professional English For Physics – I			
Course Code: 21UPHPE1	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

UNIT 1: COMMUNICATION **(6 hrs)**

Listening: Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION **(6 hrs)**

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition - Free Writing

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES **(6 hrs)**

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming (Mind mapping). Small group discussions (Subject -Specific)

Reading: Longer Reading text

Writing: Essay writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS **(6 hrs)**

Listening: Listening to lectures.

Speaking: Short talks

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs

Vocabulary: Register specific -Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS (6 hrs)

Listening: Listening comprehension - Listening for information

Speaking: Making presentations (with PPT- practice)

Reading: Comprehension passages –Note making

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

Book for Study:

Material provided by TANSCHE – Professional English for Physical Science - I

References:

1. https://www.myindiamyglory.com/2018/07/12/raman-effect-how-indian-scientist-cv-raman-discovered-why-sea-is-blue/
2. https://opensource.com/resources/internet-of-things
3. Britannica, T. E. (Ed.). (2020, April 16). *Marie Curie.* Retrieved June 18, 2020, from Encyclopædia Britannica.
4. Wikipedia, T. E. (Ed.). (16, June 2020). *Marie Curie.* Retrieved June 18, 2020, from Wikipedia.
5. http://warofcurrents.newtfire.org/
6. https://www.englishclub.com/reading/health/cell-phone.htm
7. Too Bad!":An Introduction To Robotics And Artificial Intelligence
8. https://www.britannica.com/biography/Isaac-Asimov
9. https://www.space.com/17056-kalpana-chawla-biography.html
10. https://www.bu.edu/csp/Conferences/Space_Exploration/Day1/Presentations/Kalam_Space% 20Exploration%20and%20Human%20Life.pdf

SEMESTER- II			
Professional English For Physics – II			
Course Code: 21UPHPE2	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

Objective

1. To gain knowledge regarding communication skills.
2. To organise and write proposals for conducting seminars and workshops.
3. To learn to comprehend concepts.

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	attend interviews with boldness and confidence.	**7,8,9**	**An, E**
CO-2	adapt easily into the workplace context, having become communicatively competent.	**7,8,9**	**An, E**
CO-3	apply to the research departments, development organizations / sections in companies and offices with winning proposals.	10	**An**
CO-4	discuss in small groups based on the listening and reading passages	5	**Un**
CO-5	apply the acquired vocabulary knowledge in their writing skills	5	**Ap**
CO-6	simplify the given comprehension	5	**An**
CO-7	argue on digital competence for academic and professional life	5	**Ev**
CO-8	write slogans and captions	5	**Re**

SEMESTER- I			
Professional English For Physics – II			
Course Code: 21UPHPE2	**Hrs./Week : 2**	**Hrs./Sem : 30**	**Credits : 2**

UNIT 1: Communicative Competence (6 hrs)

1. Listening – Listening to talks/lectures by eminent scientist on Physics related topics - (TED Talks) and answering comprehension exercises based on the talks
2. Speaking: Small group discussions (the discussions is based on the listening and reading Passages - open ended questions)
3. Reading: One Physics based reading texts followed by comprehension activities/exercises
4. Writing: Summary writing based on the reading passages.

UNIT 2: Persuasive Communication (6 hrs)

1. Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication
2. Speaking: Debates – Just a minute activities
3. Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions.
4. Writing: dialogue writing- writing an argumentative /persuasive essay.

UNIT 3: Digital Competence (6 hrs)

1. Listening to interviews.
2. Speaking: Interviews with subject specialists (using video conferencing skills)
3. Reading: Selected sample of Web Page
4. Writing: Functioning of a computer
5. Reading: Comprehension: Essay on Digital Competence for Academic and Professional Life.

The essay will address some aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.

UNIT 4: Creativity and Imagination (6 hrs)

1. Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – Eg.https://www.youtube.com/watch?v=8Krok63LbW8
   (Video showcasing the importance of study of Astrophysics)
2. Speaking: Making oral presentations through short films – Physics based
3. Reading: Essay on Creativity and Imagination - Physics based

4. Writing: Poster making – Writing slogans/Captions – Physics based

UNIT 5: Workplace Communication and Basics of Academic Writing (6hrs)

1. Speaking: Short presentation using PowerPoint
2. Reading: Writing: Flyers.
3. Writing: An introduction, paraphrasing.
4. Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks)

Book for Study:

Material provided by TANSCHE – Professional English for Physical Science - II

References:

1. https://www.youtube.com/watch?v=8Krok63LbW8
2. Gamow, George. *My World Line: An Informal Autobiography*, New York, 1970.
3. "Time and Space," *First You Build a Cloud: And Other Reflections of Physics as a Way of Life*, K.C. Cole
4. "The Largest Industrial Accident in World History", *StrangeChemistry*, Steven Farmer
5. https://youtu.be/moJjKqknXs
6. http://www.bhopal.com/
7. https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3
8. https://owl.purdue.edu/owl/general_writing/academic_writing/essay_writing/argumentative_essays)
9. https://youtu.be/5ctbvkAMQO4
10. https://www.wareable.com/fitness-trackers/how-your-fitness-tracker-works-1449
11. https://www.hfe.co.uk/blog/a-study-of-fitness-trackers-and-wearables/
12. https://youtu.be/of7mptTqw
13. https://www.youtube.com/watch?v=IOluK9i1yiw&feature=youtu.be
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19. https://www.bbc.com/news/science-environment-55365434
20. https://futureoflife.org/2016/09/30/artificial-photosynthesis/