MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Physics
(Choice Based Credit System)
(with effect from the academic year 2023-2024 onwards)

Semester-II				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
I	Language I	TAMIL/MALAYALAM/HINDI	E1TL21/ E1MY21/ E1HD21	3
II	Language II	ENGLISH	E2EN21	3
III	Core	HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS	EMPH21	5
III	Core	PHYSICS PRACTICAL 2	EMPHP2	3
III	Allied	ALLIED MATHEMATICS 2	EEMA21	5
IV	SEC - 2		ESPH21	2
IV	SEC - 3		ESPH22	2

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA $<$ 5.0

Part – I TAMIL

Learning Objectives:

- முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்
- தமிழ் இலக்கியப் போக்குகளையும், இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

அலகு 1:

தமிழ் இலக்கிய வரலாறு அறிமுகம்.

1. சிற்றிலக்கியம்; குறவஞ்சி, கலம்பகம், உலா, பரணி, பள்ளு பிள்ளைத்தமிழ், தூது, அந்தாதி
2. தனிப்பாடல் அறிமுகம்
3. இக்கால இலக்கியம் :- கவிதை, சிறுகதை நாடகம், உரைநடை, திராவிட இயக்கம் வளர்த்த தமிழ்.

அழகு 2

சிற்றிலக்கியமும், தனிப்பாடலும்

சிற்றிலக்கியம்:

1. கலிங்கத்து பரணி-விருந்தினருக்கு வறியவரும் நெருங்கியுண்ண முதல் கேட்பாரைக் காண்மின் காண்மின் வரை (5 பாடல்கள்)
2. திருக்குற்றாலக் குறவஞ்சி - வானரங்கள் கனிகொடுத்து
3. முக்கூடற் பள்ளு - ஆற்று வெள்ளம் நாளை வரத்
4. அபிராமி அந்தாதி - கலையாத கல்வியும் குறையாத வயதும் (பதினாறு செல்வங்கள்)
5. திருவரங்கக் கலம்பகம் - மறம் பேசவந்த தூது செல்லரித்த ஓலை சொல்லுமோ (பிள்ளைப் பெருமாள் ஐயங்கார்)
6. தமிழ்விடு தூது -முதல் பதுக் கண்ணிகள்

தனிப்பாடல்;

1. வான்குருவி யின்கூடு - ஒளவையார்
2. ஆமணக்குக்கும் யானைக்கும் சிலேடை - முதிருக்கும் கொம்பசைக்கும் மூரிதண்டேந்தி - காளமேகப் புலவர்
3. இம்பர் வான் எல்லை இராமனையே பாடி - வீரராகவர்
4. நாராய் நாராய் - சத்தி முத்தப் புலவர்

அலகு 3 இக்கால இலக்கியம் 1

1. பாரதியார் பாரத சமுதாயம் வாழ்கவே\
2. பாரதிதாசன் - சிறுத்தையே வெளியில் வா
3. நாமக்கல் கவிஞர் - கத்தியின்றி
4. தமிழ் ஒளி - மீன்கள்
5. ஈரோடு தமிழன்பன் - எட்டாவது சீர் (வணக்கம் வள்ளுவ - தொகுப்பு)

சிறுகதைகள்:

1. புதுமைப்பித்தன் - கடிதம்
2. ஜெயகாந்தன் - வாய்ச் சொற்கள் (மாலை மயக்கம் - தொகுப்பு)
3. ஆர். சூடாமணி - அந்நியர்கள்
4. உரைநடை:
5. மு.வ. கடிதங்கள் - தம்பிக்கு நூலில் முதல் இரண்டு கடிதங்கள்

அலகு - 4 இக்கால இலக்கியம் - 2

1. தந்தை பெரியார் - திருக்குறள் மாநாட்டு உரை

2. பேரறிஞர் அண்ணா - இரண்டாம் உலகத் தமிழ் மாநாட்டு உரை
3. கலைஞர் மு கருணாநிதி - தொல்காப்பிய பூங்கா - எழுத்து - நூற்பா கட்டுரை

நாடகம்/திரைத்தமிழ்:

1. வேலைக்காரி - திரைப்படம்
2. ராஜா ராணி - சாக்ரடீஸ் - ஓரங்க நாடகம்

இதழியல் தமிழ்:

முரசொலி கடிதம்

1. செம்மொழி வரலாற்றில் சில செப்பேடுகள்

அலகு 5 மொழி பயிற்சி

சொல் வேறுபாடு/பிழை தவிர்த்தல்

- வாசிப்பது - வாசிப்பவர்
- சுவர் - சுவரில்
- வயிறு - வயிற்றில்
- கோயில் - கோவில்
- கருப்பு - கறுப்பு
- இயக்குநர் - இயக்குனர்
- சில்லறை - சில்லரை
- முறித்தல் - முறிதல்
- மனம் - மனசு - மனது
- அருகில் - அருகாமையில்
- அக்கரை - அக்கறை
- மங்கலம் - மங்களம்

பயிற்சி:

- பிழையான சொற்களை ஒரு பத்தியில் கொடுத்து அந்தப் பிழையான சொற்களைச் சரியாகச் எழுதச் செய்தல்
- சிறிய பத்தி ஒன்றை ஆங்கிலத்தில் கொடுத்து அதனைத் தமிழில் மொழிபெயர்க்க வைத்தால்.

Text Books

Reference Books

1. மு. வரதராசன், தமிழ் இளகிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி.
2. மது.ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
4. தமிழ் இலக்கிய வரலாறு - முனைவர். சிற்பி பாலசுப்ரமணியம், நீல. பத்மநாபன்
5. தமிழ் இலக்கிய வரலாறு - டாக்டர் எ.கா. பெருமாள்
6. தமிழ் இலக்கிய வரலாறு - முனைவர். ப. ச. ஏசுதாசன்
7. தமிழ் இலக்கிய வரலாறு - ஸ்ரீ குமார்
8. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - பாக்கியமேரி
9. தமிழ் பயிற்றும் முறை, பேராசிரியர் ந. சுப்புரெட்டியார் - மணிவாசகர் - பதிப்பகம், சிதம்பரம்

Web Sources:

https://www.chennailibrary.com/
https://www.sirukathaigal.com/
https://www.tamilvirtualuniversity.org/
https://www.noolulagam.com/
https://www.katuraitamilblogspot.com/

PART I MALAYALAM

Course Objectives

1. To give compressive view of communication and its scope and importance in official communication and business communication

Unit I:

This unit introduces basic communication skills in Malayalam. Salutation, Discourse markers, formal and informal communication strategies are also introduced.

Unit II:

This unit introduces word processing and Editing text Auto correct- spell check & grammar check, undo& redo Text formatting Changing case, drop caps, coloring & highlighting text, adding special characters, bullets & numbering.

Unit III

This unit introduces the document formation compositional and typographical ways. Advanced page layout in word Borders, box, shading, page fills & back ground Module and Table & columns Creating tables Inserting tables from the menu & tool bar, drawing tables Manipulating tables Selecting tables elements, inserting & deleting columns & rows, adjusting table properties, are introduced . This unit introduces the Printing word documents Using print preview.
Practical knowledge in different fonts and Unicode

Unit IV

This Unit Introduces blog writing, technical writing, content editing, Proof reading, new making (Writing for career)

Unit V

This unit introduces Malayalam for Competitive Exams. Reading comprehension, reasoning, inferential comprehension, analogical creations(Competitive Malayalam)

Unit VI

Malayalam for language Specific Exams for writing UPSC, PSC Exams

Recommended Text:

1. Bharanabhasha: The State language Institute Business Communication for Success: Publisher: University of Minnesota Libraries Publishing

PART I HINDI - Kahani, Ekanki aur Vyakran

Course Objectives

The Main Objectives of this course are these courses are to

- Introduction to Hindi fiction
- Teaching of social values through stories and skits
- Practical application of grammar

Unit I

Hindi Katha-Sahitya: Parichay

1 Kahani ke Tatva
2. Hindi ke Pramukh kahanikaro ka Parichay
3. Ekanki ke Tattva
4. Hindi ke Pramukh Ekankikaro ka Parichay

Unit II

Hindi Kahaniya

1 Premchand – Bade Ghar ki Beti
2 Malathi Joshi – Vo Tera Ghar Yah Mera Ghar
3 Pita - Gyanranjan

Unit III

Hindi Ekanki

1 Lakshmi ka Swagat – Upendranath Ashk
2 Vibhajan – Vishnu Prabhakar
3 Maa Baap – Sri Vishnu

Unit IV

Vyakaran

1 Kriya Visheshan
2 Sambandh Bodhak
3 Samuchay Bodhak
4 Vismayadi Bodhak aadi shabdo ka prayog

Unit V

Pratiyogi Pariksha par aadharit Nimnalikhit Vishayo se sambandhit Prashikshan Karya

1 Tamil Bhasha: Mahakavi Bharatiyar
2 Sanket Vikas dwara Lekhan kala aur Kahani Lekhan ka Vikas
3 Gadyansh dekhkar sahi Shirshak chunna
4 Pathit Vyakaran par aadharit Vakya rachna
5 Vibhinna Pratiyogi parikshao ke bare mein suchna pradan dena

Reference Books

1 Aath Ekanki Natak – Ed. Dr. Ramkumar Verma
2 Das Ekanki

Related Online Contents (MOOCs, SWAYAM, NPTEL, YouTube, Websites, etc.)

1. Lokpriya Kahaniya: https://www.hindwi.org/sangrahaalay/100-best-stories-inhindii
2. Vo Tera Ghar Ye Mera Ghar : http://gadyakosh.org/gk/%E0%A4%B5%E0%A5%8B_%E0%A4%A4%E0%A5%87%E0%A4%B0%E0%A4%BE_%E0%A4%98%E0%A4%B0,_% E0%A4%AF%E0%A5%87_%E0%A4%AE%E0%A5%87%E0%A4%B0%E0%A4%BE_%E0%A4%98%E0%A4%B0_/_%E0%A4%AE%E0%A4%BE%E0%A4%B2%E0%A4%A4%E0%A5%80_%E0%A4%9C%E0%A5%8B%E0%A4%B6%E0%A5%80
3. https://hindistory.net/

PART II ENGLISH

Learning Objectives

- LO1 To make students realize the importance of resilience
- LO2 To enable them to become good decision makers
- LO3 To enable them to imbibe problem-solving skills
- LO4 To enable them to use tenses appropriately
- LO5 To help them use English effectively at the work place.

Unit I

RESILIENCE

Poem

1.1 Don't Quit – Edgar A. Guest

1.2 Still Here – Langston Hughes

Short Story

1.3 Engine Trouble – R.K. Narayan

1.4 Rip Van Winkle – Washington Irving

Unit II

DECISION MAKING

Short Story

2.1 The Scribe – Kristin Hunter

2.2 The Lady or the Tiger - Frank Stockton

Poem

2.3 The Road not Taken – Robert Frost

2.4 Snake – D. H Lawrence

Unit III

PROBLEM SOLVING

Prose life Story

3.1 How I taught My Grandmother to Read – Sudha Murthy Autobiography

3.3 How frog Went to Heaven – A Tale of Angolo

3.4 Wings of Fire (Chapters 1,2,3) by A.P.J Abdul Kalam

Unit IV

Tenses

4.1 Present

4.2 Past

4.3 Future

4.4 Concord

Unit V

English in the Workplace

5.1 E-mail – Invitation, Enquiry, Seeking Clarification

5.2 Circular

5.3 Memo

5.4 Minutes of the Meeting

Text Books (Latest Editions)

References Books

1. Martin Hewings. Advanced English Grammar. Cambridge University Press, 2000
2. SP Bakshi, Richa Sharma. Descriptive English.Arihant Publications (India) Ltd., 2019.
3. Sheena Cameron, Louise Dempsey. The Reading Book: A Complete Guide to Teaching Reading. S & L. Publishing, 2019.
4. Barbara Sherman. Skimming and Scanning Techniques, Liberty University Press, 2014.
5. Phil Chambers. Brilliant Speed Reading: Whatever you need to read, however. Pearson, 2013.
6. Communication Skills : Practical Approach Ed.ShaikhMoulaRamendra Kumar. Stories of Resilience, Blue Rose Publications, 2020.

Web Sources

1 Langston Hughes. Still Here
https://poetryace.com/im-still-here
2 R. K. Narayan. Engine Trouble
http://www.sbioaschooltrichy.org/work/Work/images/new/8e.pdf
3 Washington Irving. Rip Van Winkle
https://www.gutenberg.org/files/60976/60976-h/60976-h.htm
4 Frank Stockton. The Lady or the Tigerhttps://www.gutenberg.org/ebook

HEAT, THERMODYNAMICS and STATISTICAL PHYSICS

OBJECTIVES

- The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation

UNIT-I

CALORIMETRY: specific heat capacity – specific heat capacity of gases CP and CV– Meyer's relation – Joly's method for determination of CV – Regnault's method for determination of CP

LOW TEMPERATURE PHYSICS: Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect –Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.

UNIT-II

THERMODYNAMICS-I: zeroth law and first law of thermodynamics – P-V diagram – heat engine –efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.

UNIT-III

THERMODYNAMICS-II: second law of thermodynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – thermodynamical scale of temperature – Maxwell's thermodynamical relations – Clasius - Clapeyron's equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.

UNIT-IV

HEATTRANSFER: modes of heat transfer: conduction, convection and radiation. **Conduction:** thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination of thermal conductivity of a bad conductor by Lee's disc method.

Radiation: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.

UNIT-V

STATISTICAL MECHANICS: definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.

UNIT-VI

PROFESSIONAL COMPONENTS: expert lectures –seminars — webinars – industry inputs – social accountability – patriotism

TEXT BOOKS

1. BrijlalandN. Subramaniam, 2000, Heat and Thermodynamics, S.Chandand Co.
2. Narayanamoorthy and Krishna Rao, 1969,Heat,Triveni Publishers, Chennai.
3. V.R.Khanna and R.S.Bedi, 1998 1st Edition, Text book of Sound, Kedharnaath Publish and Co, Meerut
4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations,Vikas Publishing House, New Delhi.
5. Ghosh, 1996, Text Book of Sound, S.Chand and Co.
6. R.Murugeshan and Kiruthiga Sivaprasath, Thermal Physics, S.Chandand Co.

REFERENCE BOOKS

1. J.B.Rajam and C.L.Arora, 1976, Heat and Thermodynamics, 8th edition, S.Chand and Co. Ltd.

2. D.S.Mathur, Heat and Thermodynamics, Sultan Chand and Sons.
3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co.
4. Resnick, HallidayandWalker,2010, Fundamentals of Physics, 6th Edition.
5. Sears, Zemansky, Hugh D. Young ,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.

WEB RESOURCES

1. https://youtu.be/M_5KYncYNyc
2. https://www.youtube.com/watch?v=4M72kQulGKkandvl=en
3. Lecture 1: Thermodynamics Part 1 | Video Lectures | Statistical Mechanics I: Statistical Mechanics of Particles | Physics | MIT Open Course Ware
4. http://www.freebookcentre.net/Physics/Physics-Books-Online.html

CORE PRACTICAL 2

OBJECTIVES

- Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

HEAT, OSCILLATIONS, WAVES and SOUND

Minimum of Eight Experiments from the list:

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of good conductor by Searle's method.
3. Determination of thermal conductivity of bad conductor by Lee's disc method.
4. Determination of thermal conductivity of bad conductor by Charlaton's method.
5. Determination of specific heat capacity of solid.
6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method),
7. Determination of Latent heat of a vaporization of a liquid.
8. Determination of Stefan's constant for Black body radiation.
9. Verification of Stefan's-Boltzmans law.
10. Determination of thermal conductivity of rubber tube.
11. Helmholtz resonator.
12. Velocity of sound through a wire using Sonometer.
13. Determination of velocity of sound using Kunds tube.
14. Determination of frequency of an electrically maintained tuning fork
15. To verify the laws of transverse vibration using sonometer.
16. To verify the laws of transverse vibration using Melde's apparatus.

17. To compare the mass per unit length of two strings using Melde's apparatus.
18. Frequency of AC by using sonometer.

VECTOR CALCULUS AND FOURIER SERIES ALLIED MATHEMATICS II

Objectives of the Course

- To know the concepts of vector differentiation and vector integration.

UNIT-I: Vector differentiation–Gradient–Divergence and curl.
UNIT-II: Evaluation of double and triple integrals
UNIT-III: Vector integration–Line, surface and volume integrals.
UNIT-IV: Green"s, Stoke"s and Divergence theorems(without proof)– simple problems.
UNIT-V: Fourier series–Even and odd functions–Half range Fourier series.

Recommended Text

1. Dr.S.Arumugam & others- Allied Mathematics Paper-II ,New Gamma Publishing House, Palayamkottai, 2012.
2. T.K.ManicavachagomPillai–Calculus (VolII), S.Vishvanathan Printer and Publisher PVT.LTD(2012)

Reference Books

1. Dr. S.Arumugam and others–Analytical Geometry 3D &Vector Calculus, New Gamma Publishing House, Palayamkottai. (2017).
2. Susan.J.C–Vector Calculus(4thEdition),Pearson Education, Boston(2012).
3. Murray Spiegel-Vector analysis –Schaum Publishing company, NewYork (2009).

Website and e-Learning Source

1. https://nptel.ac.in

ASTROPHYSICS

Learning Objective:

- This course intends to introduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestial bodies along with the instrumentation and techniques used in astronomical research

UNIT-I

TELESCOPES: Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image

processing – radio telescopes – Hubble space telescope.

UNIT-II

SOLAR SYSTEM: Bode's law of planetary distances – meteors, meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics.

UNIT-III

ECLIPSES: types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits.

THE SUN: physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11year solar cycle – solar flares.

UNIT-IV

STELLAR EVOLUTION: H-R diagram – birth and death of low mass, intermediate mass and massive stars – Chandrasekar limit – white dwarfs – neutron stars – pulsars – black holes – supernovae.

GALAXIES: classification of galaxies – galaxy clusters –interactions of galaxies, dark matter and super clusters – evolving universe.

UNIT-V

ACTIVITIES IN ASTROPHYSICS:

(i) Basic construction of telescope
(ii) Develop models to demonstrate eclipses/planetary motion
(iii) Night sky observation
(iv) Conduct case study pertaining to any topic in this paper
(v) Visit to any one of the National Observatories

Any three activities to be done compulsorily.

TEXT BOOKS

1. Baidyanath Basu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi
2. K.S.Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi.
3. Shylaja, B.S. and Madhusudan, H.R.,(1999), Eclipse: A Celestial Shadow Play, Orient Black Swan,

PHYSICS OF MEDICAL INSTRUMENTS

Learning Objective:

- The students will be exposed to instruments like ECG, EEG, EMG, medical imaging, diagnostic specialties, operation theater and its safety which will kindle interest to specialize in instrument servicing.

UNIT-I

BIO-POTENTIALS AND ELECTRODES: transport of ions through cell membrane- resting and action potential - Characteristics of resting potential – bio-electric potential – design of medical instruments – components of bio-medical instrumentation – electrodes – electrode potential – metal microelectrode – depth and needle electrodes – types of surface electrode – the pH electrode.

UNIT-II

Bio-potential based Instrumentation: Electrocardiography (ECG) – origin of cardiac action potential - ECG lead configuration –block diagram of ECG recording set up (qualitative) – Electroencephalography (EEG) – origin of EEG – action and evoked potentials - brain waves – block diagram of modern EEG set up – electromyography (EMG) – block diagram of EMG recording setup.

UNIT-III

OPERATION THEATRE AND SAFETY: diathermy – block diagram of the electrosurgical diathermy– shortwave, microwave, ultrasonic diathermy – ventilators – servo controlled systems –RADIATION SAFETY: units of radiation - pocket dosimeter – pocket type radiation alarm – thermo-luminescence dosimeter.

UNIT-IV

MEDICAL IMAGING: nuclear imaging technique –computer tomography (CT) – principle – mathematical basis of image construction –block diagram of CT scanner – ultrasonic imaging systems – construction of transducer – display modes – MRI principle and instrumentation.

UNIT-V

DIAGNOSTICS AND SPECIALITIES: X-rays in radiography – fluoroscopy – comparison– image intensifiers – angiography – applications of X-ray examination (problems).

LASER IN MEDICINE: laser interactions with biomolecules – advantages of laser surgery – endoscopy – types of endoscopes with their operation (qualitative).

TEXT BOOKS

1. Biomedical Instrumentation and measurement, Leslie Cromwell, PHI, 2015
2. Medical Instrumentation, M. Arumugam, Anuradha agencies, 1992
3. Medical Electronics, M.J.Kumar Doss, Prathibha Publishers, 1987
4. Medical Physics, John R. Cameron and James G. Skofronick, Thrift books, Atlanta, 1985
5. Electronic Instruments and Instrumentation Technology, M. M.M.Anand, PHI, 2015

HOME ELECTRICAL INSTALLATION

Learning Objective:

- The students will get knowledge on electrical instruments, installations and domestic wiring techniques with safety precautions and servicing.

UNIT-I

SIMPLE ELECTRICAL CIRCUITS: charge, current, potential difference, resistance – simple electrical circuits – DC ammeter, voltmeter, ohmmeter – Ohm's law – difference between DC and AC – advantages of AC over DC – electromagnetic induction - transformers – inductors/chokes – capacitors/condensers – impedance – AC ammeter, voltmeter –symbols and nomenclature

UNIT-II

TRANSMISSION OF ELECTRICITY: production and transmission of electricity – concept of power grid – Series and parallel connections – technicalities of junctions and loops in circuits –transmission losses (qualitative) – roles of step-up and step-down transformers – quality of connecting wires – characteristics of single and multicore wires

UNIT-III

ELECTRICAL WIRING: different types of switches – installation of two way switch – role of sockets, plugs, sockets - installation of meters – basic switch board – electrical bell – indicator – fixing of tube lights and fans – heavy equipment like AC, fridge, washing machine, oven, geyser, jet pumps – provisions for inverter – gauge specifications of wires for various needs

UNIT-IV

POWER RATING AND POWER DELIVERED: conversion of electrical energy in to different forms – work done by electrical energy – power rating of electrical appliances – energy consumption – electrical energy unit in kWh – calculation of EB bill – Joule's heating – useful energy and energy loss – single and three phase connections – Measures to save electrical energy – energy audit

UNIT-V

SAFETY MEASURES: insulation for wires – colour specification for mains, return and earth – Understanding of fuse and circuit breakers – types of fuse: kit-kat, HRC, cartridge, MCB, ELCB – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock – fire safety for electric current

TEXT BOOKS

1. Wiring a House: 5th Edition by Rex Cauldwell, (2014).
2. Black and Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018).
3. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).

PHYSICS OF MUSIC

Learning Objective:

- To apprise and train students on the role of Physics in music and get the knowledge on the musical notes and instruments.

UNIT-I

SCIENTIFIC STUDY OF MUSIC: vibrations of atoms of matter– vibrations coupling to air – propagation of sound waves in air, other media, fluids and solids – velocity, frequency, wavelength, time period, intensity: definition and unit fs – classification of sound on frequency and velocity– human and animal sound perception– mechanism of ear and hearing – psychoacoustics

UNIT-II

SIMPLE VIBRATING SYSTEMS: simple harmonic motion – tuning fork– amplitude, phase, energy, energy loss/damping/ dissipation – power – travelling waves and standing waves– laws of vibration in stretched strings– one-dimensional medium – open and closed organ pipes – over tones, harmonics – quality of sound: pitch, timber, loudness – octaves, musical notes

UNIT-III

MUSICAL TONE: pure/simple tones – sine/cosine waves– well-defined frequencies, wavelengths, amplitudes and phases– partial tones – assembly of pure tones– mix of different frequencies and amplitudes– complex tone – superposition of simple tones – complex waveform– periodic complex waveform – formants – resonances– sound envelope

UNIT-IV

PRODUCTION OF MUSICAL SOUNDS: human voice, mechanism of vocal sound production – larynx (sound box) – stringed Instruments: plucked and bowed, guitar, mandolin, violin, piano, etc. – wind instruments: whistles, flute, saxophone, pipe organ, bagpipes, etc.– percussion instruments: plates, membranes, drums, cymbals, xylophone etc. – electronic instruments: keyboards, electric guitars, rhythm pads, etc. – analog and digital sound synthesizers,–MIDI instrument– computer generated music

UNIT-V

RECORDING OF MUSIC and SOUND: Edison phonograph – cylinder and disk records – magnetic wire and tape recorders – digital recording (e.g. to CD, DVD, etc.)– analog transducers, condenser, dynamic microphones, loudspeaker – complex sound fields – near and far fields of acoustic– spectral analysis techniques – continuous and discrete Fourier transforms, digital signal processing – digital filtering – specifications of recording studios

TEXT BOOKS

1. Physics and Music: The Science of Musical Sound by Harvey White (2014)
2. Good Vibrations – The Physics of Music by Barry Parker, (2009)
3. The History of Musical Instruments by Curt Sachs, (2006)
4. Physics and Music: Essential Connections and Illuminating Excursions by Kinko Tsuji and Stefan C. Müller(2021)