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 2021-2022 onwards)

Semester-V				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	**Core**	BASIC ELECTRONICS	CMPH51	4
III	**Core**	SPECTROSCOPY	CMPH52	4
III	**Core**	ATOMIC AND NUCLEAR PHYSICS	CMPH53	4
III	**Elective**	COMMUNICATION ELECTRONICS	CEPH52	4
III	**Practical – V**	GENERAL PRACTICAL	CMPHP5	3
III	**Practical-VI**	ELECTRONICS	CMPHP6	3
IV	**Skill based subject (Common)**	PERSONALITY DEVELOPMENT	CCSB51	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

Basic Electronics

Preamble:

1. This course provides the working of electronic devices, apply these techniques in practical circuits
2. Understand the various characteristics pertaining to diodes and its applications
3. Understand the transistor amplifiers, oscillators and wave shaping circuits
4. Understand the functions of operational amplifiers

UNIT- I: LINEAR CIRCUIT ANALYSIS

Constant voltage source, constant current source, conversion of voltage source into current source -Maximum power transfer theorem - Thevenin's theorem - Norton's theorem - hybrid parameters –determination of h parameter - equivalent circuit – the h parameters of a transistor.

UNIT - II: SEMICONDUCTORS DIODES AND DEVICES

PN Junction - V – I characteristics of PN Junction - Crystal diode as a rectifier - Zener diode - V – I characteristics of Zener diode - Tunnel diode. Half wave rectifier, centre-tap full wave rectifier -Full wave bridge rectifier - Comparison of Rectifiers - Zener diode as voltage stabilizer.

UNIT - III: TRANSISTOR AMPLIFIERS

Transistor action - Transistor connections - common emitter - common base -common collector -Analysis of amplifiers using h- parameters - RC coupled amplifier - transformer coupled amplifier - power amplifier - classification of power amplifiers (Class A, Class B and Class C) - Push pull amplifier.

UNIT - IV: OSCILLATIONS AND WAVE SHAPING CIRCUITS

Feedback principle and Barkhauson criterion - Hartley, Colpitt's, and Phase shift oscillators using transistors – Astable - Monostable and Bistable multi vibrators using transistors - Schmitt trigger –clipping and clamping circuits – Differentiating circuit – Integrating circuit.

UNIT - V: OPERATIONAL AMPLIFIER

Op-Amp -pin diagram- characteristics of ideal Op - Amp - DC and A.C analysis of Op-Amp - Bandwidth of an Op-Amp - Slew rate - Frequency response - Op- Amp with negative feedback – applications –Inverting amplifier – Input and output impedance of Inverting amplifier – Non inverting amplifier- Voltage follower- Summing amplifier - Adder – Subtractor – Integrator – Differentiator – low pass, high pass and band pass filters

Books for study

1. Principles of Electronics -V.K. Mehta & Rohit Mehta - S. Chand & Co.
2. Electronic fundamentals and applications – John D. Ryder – Prentice Hall

Books for reference

1. Electronic principles - Malvino
2. Electronic devices and circuits – David Bell – Prentice Hall
3. Basic Electronics - B. Basavaraj, H.N. Shivashankar - 2nd edition – Universities press
4. Physics of semiconductor devices – Dilip K.Roy – Universities press

SPECTROSCOPY

Preamble:

- This course facilitates an understanding of atomic and molecular spectra and the instrumentations. The paper needs a basic knowledge about atomic structure and the learners are expected to gain knowledge to identify materials with the help of various spectra

UNIT I: MICROWAVE SPECTROSCOPY

Rotation of molecules – Classification of molecules – Rotation spectra of diatomic molecules – Intensities of spectral lines – Effect of isotopic substitution – Non-rigid rotator – Spectrum of a non-rigid rotator – Linear Polyatomic molecules -Techniques and Instrumentation – Chemical analysis by microwave spectroscopy

UNIT II: INFRARED SPECTROSCOPY

I.R. spectroscopy – Vibrating diatomic molecules – Simple Harmonic Oscillator - Anharmonic oscillator – Diatomic vibrating rotator -Interaction of rotations and vibrations – Vibration of polyatomic molecules – Analysis by IR techniques

UNIT III: RAMAN SPECTROSCOPY

Raman effect- Discovery – Quantum theory of Raman effect – Classical theory of Raman Effect –Pure rotational Raman spectra of Linear molecules – Raman spectrum of symmetric top molecules - Vibrational Raman spectra – Rule of mutual exclusion – Structure determination from IR and Raman spectroscopy

UNIT IV: ULTRAVIOLET SPECTROSCOPY

Introduction – Principle of Ultraviolet Spectroscopy – Transmittance and absorbance – Lamber - Beer law – UV spectrophotometer and spectrum recording – shifts of bands with solvents – Analytical uses of UV Spectroscopy

UNIT V: NMR SPECTROSCOPY

Introduction – Theory of NMR spectroscopy and origin of NMR signal – instrumentation for NMR spectroscopy – Techniques and principle of NMR – Application of NMR Spectroscopy – Magnetic resonance imaging (MRI) – interpretation of NMR spectra

Books for Study

1. Fundamentals Of Molecular Spectroscopy - Colin N Banwell Elaine- M Mccash Fifth Edition Book

2. Molecular structure and spectroscopy - G. Aruldhas, PHI Learning Pvt. Ltd, India
3. Spectroscopy of Organic compounds – P.S. Kalsi, New Age International Publishers, 4th Edition

Books for Reference

1. Hand book of Analytical Instruments -R.S. Khandpur, Tata MC Grow Hill Ltd.
2. Spectroscopy - G.R. Chatwal and S.K. Anand, Himalaya publishing House, New Delhi

Atomic and Nuclear Physics

Preamble:

- The course provides an introductory account about the atomic and nuclear structures. This paper does not need any special prerequisite except the basic understanding of materials at the school level and the learners are expected to know about atomic models, nuclear models, X-rays, cosmic rays, nucleation reactions, detectors and accelerators etc.

Unit I: FREE ELECTRONTHEORY, BAND THEORY AND POSITIVE RAYS

Free electron theory of metals – expressions for electrical conductivity – thermal conductivity -Hall effect- Classification of solids on the basis of band theory- Properties of positive rays -Thomson's parabola method - Aston's mass spectrograph

Unit II: ATOMIC STRUCTURE

Vector atom model-Quantum numbers associated with the vector atom model- Pauli's exclusion principle-L-S coupling, j-j coupling - magnetic dipole moment due to orbital motion of the electron-Stern and Gerlach experiment- Normal Zeeman effect-theory and experiment-Anomalous Zeeman effect (Explanation only)-Stark effect.

Unit III: X-RAYS AND COSMIC RAYS

Production of X-rays – properties-absorption of X-rays-Bragg's X-ray spectrometer – Powder method – Laue's method – Rotating crystal method –Moseley's law- Cosmic rays-discovery-latitude, altitude and -north –south effects- primary and secondary cosmic rays- cosmic ray showers-Van Allen belt.

Unit IV: ATOMIC NUCLEUS, DETECTORS AND ACCELERATORS

General properties of the nucleus- binding energy curve- Liquid drop model - Shell model -Alpha,beta and gamma rays-properties- Laws of radioactive disintegration- half -life period –mean life period – α decay, β- decay - ϒ decay (Explanation only) - G.M.counter-Wilson cloud chamber-Cyclotron- betatron.

Unit V: NUCLEAR REACTIONS AND ELEMENTARY PARTICLES

Q-value of nuclear reaction- Nuclear fission-Chain reaction–energy released in fission- Nuclear reactor- Nuclear fusion –fusion reactor-Principle and action of atom bomb - hydrogen bomb-Classification of elementary particles - fundamental interaction- the quark model

Books for study

1. Modern Physics - R. Murugesan (S.Chand &Co.)
2. Atomic and Nuclear Physics - N.Subrahmanyan, Brijal, S. Chand & Co Ltd, New Delhi.

Books for Reference

1. Modern Physics - B.S.Agarwal, Kedarnath Ramnath, Meerut, Delhi.
2. Atomic and Nuclear Physics - Shatendra Sharma – Pearson Publications
3. Modern Physics - B.V.N Rao, Wiley Eastern Ltd, New Delhi
4. Modern Physics- Seghal Chopra & Seghal, Sultan Chand 1998
5. Perspective of Modern Physics-Arther Beiser –Tata-Mc Graw Hill Publishing Company

PROGRAMMING IN C++

Preamble:

- Objective of the course is to provide knowledge about the basics of Computer programming in C++ by writing programs. The paper does not need any special prerequisite and the learners are expected to come out with the ability to apply the computer language C++ to solve problems.

UNIT-I: WHAT IS C++

Introduction –comments –output operator-input operator-io stream file –tokens - keywords -identifiers and constants - declaration of variables - basic data types - operators in C++ -expressions and their type-hierarchy of arithmetic - control structures- a simple C ++ program (arithmetic operations using do while loop)

UNIT-II: ARRAYS AND FUNCTIONS IN C++

Introduction - one dimensional and two dimensional arrays - initialization of arrays – a simple matrix addition program. Functions - introduction - function prototyping - inline functions -function overloading –program to find the factorial of a number using function

UNIT-III: CLASSES AND OBJECTS

Introduction – specifying a class – defining member functions – creating objects - C ++ program with class - nesting of member functions - objects as function arguments - arrays within a class - friend functions-constructors –default constructors-parameterized constructors- copy constructor - multiple constructors

UNIT-IV: OPERATOR OVER LOADING AND IN HERITANCE

Introduction – defining operator overloading-over loading unary operators –binary operators – rules for overloading operators-Inheritance - single inheritance - multiple inheritance –multi level inheritance-hybrid inheritance

UNIT-V: MANAGING CONSOLE I / O OPERATIONS

Introduction - C ++ stream - C ++ stream classes - formatted console I/O operations (width, precision, fill) - working with files - classes for file steam operations - opening and closing a file – detecting end of file - opening files using constructors and open – working with single and multiple files

Books for study

1. Object oriented Programming with C++ - E.Balagurusamy, Tata Mc Graw-Hill publishing company Ltd. New Delhi
2. Programming with C++ - D. Ravichandran, Tata Mc Graw-Hill publishing company Ltd. New Delhi

Books for reference

1. Object oriented Programming in C++- 4th Edn. Robert Lafore-Macmilan publishing company Ltd.
2. Fundamentals of Programming with C++ -Richard l. Halterman

COMMUNICATION ELECTRONICS

Preamble:

- This course enables the students to understand various modulation and demodulation techniques used for communication. The paper needs a basic knowledge in electronics and mathematics and the learners are expected to come out with the ability to choose proper modulation techniques.

UNIT-I: AMPLITUDE MODULATION AND TRANSMISSION

Introduction–amplitude Modulation–AM envelop–AM frequency spectrum and bandwidth– Phas or representation of AM with carrier – coefficient to f modulation or percentage modulation or modulation index – degrees of modulation – AM power distribution – AM Current relation and efficiency-modulation by complex information signal –double side band suppressed carrier AM - single side band suppressed carrier AM – Vestigal side band amplitude modulation – AM modulator circuits – emitter modulations or low power AM –collector modulator or medium and high power AM modulator - AM transmitters –Broadcast AM transmitters–Low level of AM transmitter–High level AM transmitter.

UNIT-II: AMPLITUDE MODULATION - RECEPTION

Comparison of AM system – Quadrature amplitude modulation – principles of AM detection – AM receivers – receiver parameters – Tuned radio frequency (TRF) receiver or straight receiver –principles of super hetrodyne – double frequency conversion AM receiver.

UNIT-III: ANGLE MODULATION – TRANSMISSION

Introduction – Frequency modulation – Phase modulation – Phase deviation and modulation index – Multi tone modulation – Transmission band width of FM – conversion of PM to FM or frequency modulator– conversion of FM to PM / phase modulators – commercial broadcast FM – phase or representation of an FM and PM – average power of an AM/FM wave – generation of FM – direct method of FM generation – reactance tube modulator– indirect method of FM wave generation – FM transmitters – indirect method – Comparison of AM and FM.

UNIT-IV: FM RECEPTION

FM detectors – Balanced slope detector – Foster seemly discriminator – ratio detector –FM super heterodyne receiver–FM noise suppression–threshold extension by FMFB technique.

UNIT–V: DIGITAL MODULATION TECHNIQUES

Introduction–BFSK–Binary phase shift keying – Quadrature PSK –Differential PSK – Performance comparison of digital modulation schemes - M ary FSK– correlative coding– Duo binary encoding.

Book For Study

1. Principles Of Communication Engineering - Dr. K.S.Srinivasan, Second Edition: 2010.
2. Electronic communication systems – George Kennedy & Bernard Davis, Tata Mcgraw Hills, 4th edition, 2008

Books for reference:

1. Electronic communication systems – Blake, Joseph J Adams ki, Sun Yifeng, Delamer publication, 2nd edition, 2012 (Rupa Publication, India)
2. Fundamentals of Electrical engineering – Wayone tomasi

PRACTICAL - V
GENERAL PRACTICAL

(6 Experiments compulsory)

1. Conversion of Galvanometer into Voltmeter and Ammeter
2. Spectrometer – Cauchy's Constants
3. Young's Modulus – Elliptical Fringes
4. Potentiometer – Calibration of Voltmeter (High Range)
5. Potentiometer – Temperature Coefficient of Resistance
6. Thevanin's and Nortan's theorem – Verification
7. Ballistic Galvanometer – High resistance by leakage
8. Desauty's Bridge – Determination of C, C1 & C2 in series and parallel

PRACTICAL-VI
ELECTRONICS

(6 experiments compulsory)

1. V-I Characteristics of Junction diode and Zener diode
2. Transistor characteristics
3. Colpitts Oscillator
4. Single stage amplifier – with and without feedback
5. Astable multivibrator using 555 timer
6. OPAMP – Adder & Subtractor
7. OPAMP – Differentiator & Integrator
8. OPAMP – Low Pass & High Pass Filter

PERSONALITY DEVELOPMENT

UNIT: I - PERSONALITY

Definition –Determinants –Personality Traits –Theories of Personality –Importance of Personality Development. SELF AWARENESS–Meaning –Benefits of Self –Awareness –Developing Self –Awareness. SWOT–Meaning –Importance-Application –Components. GOAL SETTING-Meaning-Importance –Effective goal setting –Principles of goal setting –Goal setting at the Right level.

UNIT :II- SELF MONITORING

Meaning –High self –monitor versus low self monitor –Advantages and Disadvantages self monitor-Self –monitoring and job performance. PERCEPTION-Definition-Factor influencing perception-Perception process –Errors in perception –Avoiding perceptual errors. ATTITUDE–Meaning-Formation of attitude –Types of attitude -Measurementof Attitudes –Barriers to attitude change –Methods to attitude change.

ASSERTIVENESS-Meaning –Assertiveness in Communication –Assertiveness Techniques –Benefits of being Assertive –Improving Assertiveness.

UNIT : III - TEAM BUILDING

Meaning –Types of teams –Importance of Team building-Creating Effective Team. LEADERSHIP–Definition –Leadership style-Theories of leadership –Qualities of an Effect leader. NEGOTIATION SKILLS–Meaning –Principles of Negotiation –Types of Negotiation –The NegotiationProcess –Common mistakes in Negotiation process. CONFLICT MANAGEMENT–Definition-Types of Conflict-Levels of Conflict –Conflict Resolution –Conflict management .

UNIT :IV - COMMUNICATION

Definition –Importance of communication –Process of communication -Communication Symbols –Communication network –Barriers in communication –Overcoming Communication Barriers. TRANSACTIONAL ANALYSIS–Meaning –EGO States –Types of Transactions –Johari Window-Life Positions. EMOTIONAL INTELLIGENCE-Meaning –Components of Emotional Intelligence-Significance of managing Emotional intelligence –How to develop Emotional Quotient. STRESS MANAGEMENT–Meaning –Sources of Stress –Symptoms of Stress –Consequences of Stress –Managing Stress.

UNIT :V - SOCIAL GRACES

Meaning–Social Grace at Work –Acquiring Social Graces. TABLE MANNERS–Meaning –Table Etiquettes in Multicultural Environment-Do’s and Don’ts of

Table Etiquettes. DRESS CODE–Meaning-Dress Code for selected Occasions –Dress Code for an Interview. GROUP DISCUSSION–Meaning –Personality traits required for Group Discussion-Process of Group Discussion-Group Discusson Topics. INTERVIEW–Definition-Types of skills –Employer Expectations –Planning for the Interview –Interview Questions-Critical Interview Questions.

REFERENCES:

1. Dr.S. Narayana Rajan, Dr. B. Rajasekaran, G. Venkadasalapthi, V. Vijuresh Nayaham and Herald M.Dhas, Personality Development, Publication Division, Manonmaniam Sundaranar University, Tirunelveli
2. Stephan P.Robbins, Organisational Behaviour, Tenth Edition, Prentice Hall of India Private Limited, New Delhi,2008.
3. Jit S. Chandan, Oragnisational Behaviour, Third Edition, Vikas Publishing House Private Limited, 2008.
4. Dr.K.K. Ramachandran and Dr.K.K. Karthick, From Campus to Corporate, Macmillan Publishers India Limited, New Delhi,2015.