DEPARTMENT OF PHYSICS

CBCS SYLLABUS

BACHELOR OF SCIENCE

PROGRAMME CODE - P

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

CRITERION - I

1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System

> **Syllabus copies with highlights of contents focusing on Elective Course System**

To be Noted:

HIGHLIGHTED	COURSE
	Elective

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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DEPARTMENT OF PHYSICS-UG
(w.e.f. 2017-2018 onwards)

COURSE STRUCTURE-SEMESTER WISE

Sem	Part	Subject code	Title of the paper	Teaching hrs.(Per week)	Duration of exam (hrs)	C.A	S.E	Total	Credits
1	I	171T1	Part –I Tamil	6	3	25	75	100	3
	II	172E1	Part-II English	6	3	25	75	100	3
	III	17P11	Core – Mechanics, properties of matter and sound	4	3	25	75	100	4
		17P1P	Core - Major Practical – I	2	-	-	-	-	-
		17AM1	Allied 1 - Mathematics – I	6	3	25	75	100	4
	IV	17SEP11	Basic electronics	2	2	25	75	100	2
		17SEP12	Digital Electronics	2	2	25	75	100	2
		17NMP1	Energy Physics	2	2	25	75	100	2
2	I	171T2	Part –I Tamil	6	3	25	75	100	3
	II	172E2	Part-II English	6	3	25	75	100	3
	III	17P21	Core – Heat and Thermodynamics	4	3	25	75	100	4
		17P2P	Core - Major Practical – I	2	3	40	60	100	3
		17AM2	Allied 1- Mathematics – II	6	3	25	75	100	5
	IV	17SEP21	Electronic Instrumentation	2	2	25	75	100	2
		17SEP22	Electricity	2	2	25	75	100	2
		17NMP2	Astro Physics	2	2	25	75	100	2
3	I	171T3	Part-I Tamil	6	3	25	75	100	3
	II	172E3	Part-II English	6	3	25	75	100	3
	III	17P31	Core – Electro Magnetism	4	3	25	75	100	4
		17P4P	Core - Major Practical - II	2	-	-	-	-	-

		17AM3	Allied 1 - Mathematics – III	6	3	25	75	100	4
		17AKP3	Allied 2- Physical Chemistry	4	3	25	75	100	4
		17AKP4P	Allied 2 Practical I-Qualitative Analysis	2	-	-	-	-	-
4	I	171T4	Part-I Tamil	6	3	25	75	100	3
	II	172E4	Part-II English	6	3	25	75	100	3
	III	17P41	Core – Optics	4	3	25	75	100	4
		17P4P	Core - Major Practical – II	2	3	40	60	100	3
		17AM4	Allied 1 - Mathematics – IV	6	3	25	75	100	5
		17AKP4	Allied 2-Organic and Physical chemistry	4	3	25	75	100	4
		17AKP4P	Allied 2 Practical I-Qualitative Analysis	2	3	40	60	100	1
5	III	17P51	Core – Atomic and Nuclear Physics	4	3	25	75	100	4
	III	17P52	Core –Programming with C++	4	3	25	75	100	4
	III		**Core - Elective –I**	4	3	25	75	100	4
		17P61P	Core - Major Physics Practical – III	3	-	-	-	-	-
		17P62P	Core - Major Electronics Practical – IV	3	-	-	-	-	-
		17PPR6	Major Elective –Project	2	-	-	-	-	-
		17AKP5	Allied 2- Inorganic, Physical and Medicinal Chemistry	4	3	25	75	100	4
		17AKP6P	Allied 2 Practical II-Volumetric Analysis	2	-	-	-	-	-
	IV	17SEP51	Fibre optic communication	2	2	-	-	100	2
		174EV5	Environmental studies	2	2	-	-	100	2
6	III	17P61	Core - Solid State Physics	4	3	25	75	100	4
	III	17P62	Core – Spectroscopy	4	3	25	75	100	4
	III		**Core - Elective –II**	4	3	25	75	100	4
		17P61P	Core - Major Physics Practical – III	3	3	40	60	100	5
		17P62P	Core - Major Electronics Practical – IV	3	3	40	60	100	5
		17PPR6	**Core- Elective-III Project**	2	3	20	80	100	3
		17AKP6	Allied 2- Analytical and Inorganic Chemistry	4	3	25	75	100	4
		17AKP6P	Allied 2 Practical II-Volumetric Analysis	2	3	40	60	100	1
	IV	17SEP61	Introduction to Microcontrollers 8051	2	2	-	-	100	2
		174VE6	Value education	2	2	-	-	100	2
	V	175NS4/ 175PE4	Extension Activities NSS/Phy. Education	-	2	-	-	100	1
			Total	180					140

Electives
Semester V (Elective I- Choose any one)

1. Electronics   - 17PE5A
2. Numerical methods - 17PE5B

Semester VI (Elective II- Choose any one)

1. Theoretical Physics   -17PE6A
2. Applications of Electronic Devices and Instrumentation   -17PE6B

Elective-III Project   -17PPR6

Allied – Physics for Maths/Chemistry Students
CBCS

Class	Sem	Sub Code	Title of the paper	Teaching hrs(Per week)	Duration Of exam (hrs)	Marks allotted			
						C. A	S.E	Total	Credits
I Maths/ II Chemistry	I/III	17AP1	Mechanics, Properties of Matter and sound	4	3	25	75	100	4
		17AP2P	Allied - Physics Practical-I	2	-	-	-	-	-
I Maths/II Chemistry	II/IV	17AP2	Thermal Physics	4	3	25	75	100	4
		17AP2P	Allied - Physics Practical-I	2	3	40	60	100	1
IIMaths/ III Chemistry	III/V	17AP3	Electricity and Electronics	4	3	25	75	100	4
		17AP4P	Allied - Physics Practical-II	2	-	-	-	-	-
II Maths/III Chemistry	IV/VI	17AP4	Optics	4	3	25	75	100	4
		17AP4P	Allied - Physics Practical-II	2	3	40	60	100	1

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ELECTIVE – I

Title of the Paper	**: Electronics**		
Semester	**: V**	**Contact Hours**	**: 4**
Subject Code	**: 17PE5A**	**Credits**	**: 4**

Objectives:

　　To introduce the fundamentals of

1. The various rectifiers and filters built of diodes and fundamentals of transistors

2. Operation of power Amps and Op Amps, Types of FETs and Oscillators

3. Sequential circuits their action and Converters

Unit: I　　Diode Circuits and Transistor fundamentals

　　The Half Wave Rectifier-The Transformer-The Full Wave Rectifier-The Bridge Rectifier-The Choke Input Filter-The Capacitor Input Filter-Clippers and Limiters-Clampers-The Zener Diode-The Loaded Zener Regulator-Variations in Current Gain-The Load Line-The Operating Point.

Unit: II　　Power Amplifiers and FETs

　　Darlington connections- Amplifier terms-Two load lines-Class A operation-Class B operation -FETs Basic ideas-Drain curves-The Transconductance curve-Biasing in the Ohmic region-Biasing in the active region- Transconductance-The Depletion mode MOSFET.

Unit: III   Operational Amplifiers and Oscillators

Introduction to Op Amps-The 741 Op Amp-The Inverting Amplifier-The Non Inverting Amplifiers-Theory of Sinusoidal Oscillation-The Wein's bridge Oscillator-The Colpitt's Oscillator-The 555 timer-Astable operation of the Timer.

Unit: IV   Digital Sequential Circuits

Introduction-RS flip flops-Clocked RS flip flop -JK flip flop-JK master slave flip flop-D flip flop-Types of Shift registers-Serial in Serial out-Serial in Parallel out-Parallel in Serial out-Parallel in Parallel out.

Unit: V   Counters and converters

Asynchronous counters- 3 Bit up and down counters-Synchronous counters-Decade counter-Variable resistor networks-Binary ladders-D/A converters-A/D converters.

Text Books:

1. Donald Mavino .A, Leach .P & Saha Gautam, *Digital Principles and applications*, Tata Mc Graw hill, New Delhi, Sixth Edition, 2002. [UNITS: IV, V]

2. Malvino.A.P, *Electronic Principles*, Tata Mc Graw Hill, New Delhi, Seventh Edition, 2002. [UNITS: I, II, III]

Unit: I   Chapters   4.1-4.6, 4.10, 4.11, 5.1, 5.2, 7.1-7.3

Unit: II   Chapters   11.4,-12.1-12.4, 13.1-13.6, 14.1-14.3

Unit: III   Chapters   18.1-18.4, 23.1, 23.2, 23.4, 23.7, 23.8

Unit: IV   Chapters   8.1, 8.2, 8.4, 8.5, 8.8, 9.1-9.5

Unit: V   Chapters   10.1, 10.3, 10.5, 12.1-12.6

Reference books:

1. Chetan .D Pariksh, Christos Halkias, Jacob Millman, Millmans, *Integrated Electronics-Analog and digital Circuits an d Systems,* Tata Mc Graw hill, New Delhi, Second Edition, 2012.

2. Ghosh .B, *Fundamental Principles of Electronics*, Arunabha Sen Books and Allied (p) Ltd, Kolkata, Second Edition, 2011.

3. Jose Robin .G, Ubaldraj .A*, Analog electronics and Digital Electronics,* Indira Publications, Marthandam, First Edition, 2008.

4. Rohit Mehtha, V.K. Mehtha, *Principles of electronics*, S. Chand And company Ltd, New Delhi, Eleventh Edition,2012

5. Santhiram Kal, *Basic Electronics, Devices circuits and IT fundamentals*, PHI Learning Private Learning, New Delhi, First Edition, 2010.

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ELECTIVE -I (OPTIONAL)

Title of the Paper : Numerical Methods

Semester : V	**Contact Hours**	: 4
Subject Code : 17PE5B	**Credits**	: 4

Objectives:

To introduce the fundamentals of

1. Solving different kinds of problems occurs in computer applications

2. The students would be acquainted with the basic concepts in numerical methods.

Unit- I   Algebraic and transcendental equations

Introduction – Errors in numerical computation method - Order of convergence - Iterative method -Successive approximation method - Bisection method – Method of false position.

Unit- II   Simultaneous equations

Newton Raphson method - Gauss elimination method – Gauss Jordan method – Gauss Seidel Iteration method (problems only).

Unit- III   Interpolation

Newton's interpolation formulae – Central difference interpolation formula (problems only) – Lagrange's interpolation.

Unit- IV   Numerical Differentiation and Integration:

Newton's forward and backward difference formulae – Numerical integration – Trapezoidal rule – Simpson's 1/3 rule (problems only).

Unit- V   Differential equations

Numerical solution of ordinary differential equations – Taylor's series method- Euler's method – Runge kutta method (2nd & 4th order) (problems only).

Text Book:

1. Arumugam .S, Thangapandi Issaac .A, Somasundaram .A, *Numerical methods,* Scitech Publications (India) PVT Ltd, Chennai, 2002.

Unit: I	**Chapters**	**3.1, 3.2, 3.4**
Unit: II	**Chapters**	**4 .3, 4.4, 4.8**
Unit: III	**Chapters**	**7.1-7.3**
Unit: IV	**Chapters**	**8.1-8.2, 8.5**
Unit: V	**Chapters**	**10.1-10.4**

Reference Books:

1. Kandasamy P, Thilagavathy K Gunarathy K, *Numerical Methods*, S.Chand and Company Ltd, New Delhi, Third Edition. 2003.

2. Dr.Vedamurthy V.N, Dr.Iyengar.N.Ch.S.N , *Numerical Methods*, Vikas Publishing House PVT Ltd, Chennai 2008.

3. Rao V. Dukkipati, Numerical Methods, New Age International (p) Limited, Publishers, New Delhi, First Edition, 2010.

4. Sastry .S.S, *Introductory Methods of Numerical Analysis,* Prentice Hall Of India Private Ltd, New Delhi,2008.

5. Singaravelan, *Numerical Methods*, Meenakshi Agency, Channai, Sixth Edition, 2008.

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Elective-I

Title of the Paper	: Theoretical Physics		
Semester	: VI	**Contact Hours**	: 4
Subject Code	: 17PE6A	**Credits**	: 4

Objectives:

To familiarize the students with

1. Basic concept of quantum idea.

2. Dual nature of microscopic particles.

3. Theory of relativity and its consequences.

Unit-I Classical Mechanics

Conservative Forces-Conservation theorem for energy of a particle-Mechanics of a system of particles-Degrees of Freedom – Constraints- Types of Constraints - Generalized co-ordinates- Transformation Equations - D'Alembert's Principles-Lagrangian Functions-Lagrange's Equation of Motion - Derivation of Lagrange's Equation of Motion -Application of Lagrange's Equation- Simple Pendulum –Compound Pendulum - The Atwood's Machine - The Hamiltonian Function H -Hamiltonian equation with derivation.

Unit-II   Statistical Mechanics

Microscopic and Macroscopic descriptions-Ensembles-Degenerate and Non degenerate Ensembles-Phase space-Micro and Macro states- Thermodynamic probability- Boltzmann's theorem on entropy and probability –Derive the Boltzmann relation connecting entropy and Probability-Fundamental postulates of statistical mechanics- Statistical equilibrium.

Maxwell-Boltzmann distribution law-Application of Maxwell-Boltzmann distribution law to an ideal gas-Maxwell-Boltzmann velocity distribution law.

Unit-III   Quantum Statistics

Introduction-Quantum statistics of identical particles - Bose-Einstein distribution law-Application of B.E Statistics- Planck's law of radiation-deduction-Wien's and Rayleigh-Jean's law-Fermi Dirac Distribution Law – Application of Fermi Driac Statistics-Comparision of three statists.

Unit-IV   Wave Mechanics

Introduction- The De-Broglie wavelength- Davisson and Germer's Experiment-G.P.Thomson's experiment- Wave velocity of De-Broglie waves- Group velocity of De- Broglie waves- Expression for Group velocity- Relation between group velocity and wave velocity-Heisenberg's Uncertainty principle.

Unit-V   Relativity

Frames of reference-Galilean transformation equation-Michelson Morley experiment-Postulates of Special theory of Relativity-Lorentz transformation equations-Derivation of the Lorentz transformation equations - Einstein's Mass- Energy Relation-Relation between the total energy, rest energy and the Momentum**.**

Text book:

1. R. Murugesan, *Theoretical physics*, First Edition, S.Chand & Company, New Delhi, 2004.

Unit: I	**Chapters**	**1.1-1.8, 1.14-1.20, 1.24-1.26**
Unit: II	**Chapters**	**2.1-2.12**
Unit: III	**Chapters**	**2.13-2.24**
Unit: IV	**Chapters**	**3.9, 3.10, 3.12-3.18**
Unit: V	**Chapters**	**4.1-4.6, 4.11, 4.12**

Reference Books:

1. Beiser, Shobhit Mahajan, S.Rai Choudhury,*Concepts of Modern Physics*, Tata MC Graw Hill Education Private Limited, New Delhi, Sixth Edition, 2012.

2. Herbert Goldstein, *Classical Mechanics*, Narosa Publishing house Pvt Ltd, New Delhi, Second Edition, 2001.

3. Murray R.Spiegel, *Theory and Problems of Theoretical Mechanics*, Tata MC Graw Hill Education Private Limited, Sixth Edition, New Delhi, 2012.

4. Panat .P.V, *Thermodynamics and Statistical Mechanics*, Narosa Publishing house Pvt Ltd, New Delhi, Second Edition, 2011.

5. Thankappan .V.K, *Quantum Mechanics*, New Age International (P) Ltd, New Delhi, Second Edition, 2012.

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Elective- II

Title of the Paper: Applications of Electronic Devices and Instrumentation

Semester	: VI	Contact Hours	: 4
Subject Code	: 17PE6B	Credits	: 4

Objectives:

To expose the student to

1. Electronic Instrumentation of Various measuring instruments.

2. Working and types of various electronic meters.

Unit-I   Electronic Instruments

Electronic instruments- Multimeter- Applications of Multimeter- Sensitivity of multimeter- Merits and Demerits of multimeter- Meter protection- Vacuum tube voltmeter- Applications of VTVM- Merits and Demerits of VTVM- Cathode Ray Oscilloscope- Deflection sensitivity of CRT- Display of signal wave f orm on CRO - Signal pattern on screen- Various control of CRO- Applications of CRO.

Unit- II   Recorders

Introduction- Strip Chart Recorder- Galvanometer Type Recorder-Null Type Recorder (Potentiometric Recorders- X-Y Recorder- Magnetic Recorders- Frequency Modulation (FM)- Recording- Applications of a Strip Chart Recorder- Multiple Recorder.

Unit -III   Silicon Controlled Rectifier

Introduction -Silicon Controlled Rectifier (SCR)- Working of SCR- Equivalent circuit of SCR- Important terms- V-I characteristics of SCR- Applications of SCR- Light activated SCR.

Unit –IV   Power electronics

Introduction -Power electronics- The Triac- Triac Construction- Triac Operation- Triac Characteristics-Applications of Triac- The Diac-Application of diac-Uni-junction Transistor(UJT)- Equivalent circuit of a UJT-Characteristics of UJT- Advantages of UJT- Applications of UJT as an oscillator.

Unit- V   Integrated circuits

Introduction-Integrated circuit- advantages and disadvantages of integrated circuits- IC classifications- Fabrication of components on monolithic IC- Simple monolithic ICs- IC packings-IC symbols- Scale of integration- Some circuits using I Cs- OP Amp: Inverting and Non- inverting – Adder and Subrator- Differentiator and Integrator.

Text Books:

1. Mehta, Rohit Mehta V.K., *Principles of electronics,* 2013, S. Chand & co   Limited, Ram Nagar, New Delhi, Eleventh Edition, 2008 **[**UNIT -I,III,IV,V]

2. Kalsi .H.S, *Electronic Instrumentation*, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, Third Edition, 2003. **[**UNIT -II]

Unit: I   Chapter   22.1 – 22.10,22.14, 22.15, 22.17-22.20

Unit: II   Chapter   12.1 – 12.4, 12.6 – 12.8, 12.15

Unit: III   Chapter   20.1 – 20.5, 20.12, 20.13

Unit: IV   Chapter   20.1-21.3, 21.5, 21.6, 21.8-21.15

Unit: V   Chapter   23.1, 23.2, 23.4, 23.6-23.11, 25.15, 25.24-25.26,25.32,25.34

Reference Books:

1. Albert D. Helfrick, William D.cooper, *Modern Electronic Instrumentation and Measurement techniques*, PHI Learning Private Limited, New Delhi, Third Edition, 2011.

2. Basudev Ghosh, *Fundamental Principles of Electronics,* Books and Allied (p) Ltd, Kolkata, Second Edition, 2011.

3. Jose Robin .G, Ubald Raj .A, *Basic Electronics and Applied Electronics*, Indira Publication, Martha dam, Sixth Edition, 2004.

4. Prithwiraj Purkait, Budhaditya Biswas, Santanu Das, Chiranj ib Koley, Electrical and Electronics Measurements and Instrumentation, PHI Learning Private Limited, New Delhi, Third Edition, 2013.

5. Rangan C.S, Sarma G.R, Mani .VSV, *Instrumentation Devices& systems*, Tata McGraw-Hill Education, Private Limited, New Delhi, Second Edition, 2012.

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Elective –III Project

Title of the Paper : Project
Semester : VI   **Contact Hours : 2**
Subject Code : 17PPR6   **Credits** : 3

Students have to carry out Project Works under the guidance of the members of the Physics Department during V and VI semester 2 hours per week. PROJECT Work may be chosen in any field in Physics. Each batch will complete the project work in the month of February and submit their report in March. It will be duly signed by the project guide and the HOD of Physics. It will be evaluated 80 marks for external examiner and 20 marks for internal examiner. The viva on project work will be conducted during the Practical Examination at the end of VI semester. The viva on project will be conducted jointly by Guide, External Examiner HOD and the members of staff.