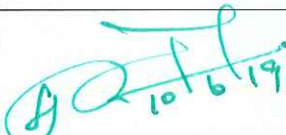
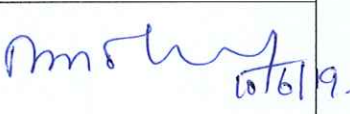


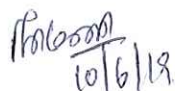
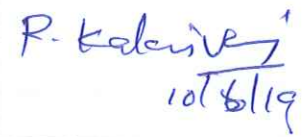
Dr.Ambedkar Govt. Arts College(Autonomous), Chennai-39.

Department of Physics

Board of Studies meeting-2019

Date: 10-06-2019

Sl.no.	Name of the members	Designation/Institution	Signature
1.	Dr.D.Subashini Convenor	Head, Department of Physics Dr.Ambedkar Govt. Arts College, Chennai-39.	 10/6/19
2.	Dr.K.Sivaji University nominee	Professor Dept. of Nuclear Physics University of Madras, Chennai-5.	 10/6/19
3.	Dr.P.Murugakoothan Subject expert 1	Principal C. Kandaswami Naidu College for Men, Anna nagar, Chennai – 600 102.	 10/6/19
4.	Dr.R.Mohan Kumar Subject expert 2	Associate Professor Department of Physics Presidency College, Chennai-5.	 10/6/19.
5.	Dr.G.KumarSathian Industrial Nominee	Proprietor Florani, Adyar, Chennai-20.	 10/6/19
6.	Mr.K.Balaraman Student Alumni	M.Sc Physics Department of Physics Nandanam College, Chennai-35.	 10/6/19
7.	Mrs.P.R.Kanimozhi Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
8.	Dr.S.Seshadri Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19

9.	Mrs.S.Saradha Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	
10.	Dr.A.C.Ganesh Kumar Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
11.	Mr.N.Mani Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
12.	Dr.T.HemaThankaChristlet Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
13.	Dr.S.V.Rajasekaran Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
14.	Dr.K.Srinivasan Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
15.	Dr.Lydia Caroline Manohar Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10.6.19
16.	Dr.S.Karthikeyan Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	
17.	Dr.M.KarlChinnu Member	Assistant Professor Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19
18.	Mrs.R.Kalaivani Guest Lecturer	Guest Lecturer Dept. of Physics Dr.Ambedkar Govt. Arts College, Ch-39.	 10/6/19

The following were approved by the board of studies meeting for the course B.Sc Physics as given below:

1. It is resolved to adopt 75% of TANSCHS syllabus, and 25% of the syllabus designed by the department.
2. It is resolved to have 10 core papers, 5 practicals and 3 elective papers.
3. The title of the Papers are as follows:

Core 1	Mechanics and Properties of Matter
Core 2	Heat, Thermodynamics and Sound
Core 3	Optics and Spectroscopy
Core 4	Electricity and Electromagnetism
Core 5	Analog and digital Electronics
Core 6	Atomic Physics
Core 7	Classical and Statistical Mechanics
Core 8	Relativity and Quantum Mechanics
Core 9	Nuclear Physics
Core 10	Solid State Physics
Elective 1	Energy Physics
Elective 2	Mathematical Physics
Elective 3	Microprocessor Fundamentals

4. The following Non Major Electives are selected.

Fundamentals of Physics – I

Fundamentals of Physics - II

D. Subashini
10/6/19

M. J.
10/6/19

G. S. S.
10/6/19

M. S.
10/6/19

Dr. AMBEDKAR GOVERNMENT ARTS

COLLEGE
039

(AUTONOMOUS) VYASARPADI, CHENNAI – 600

(Accredited by NAAC at Level 'B')



B.Sc., PHYSICS
(TANSCHÉ Syllabus)

Under Choice Based Credit System

(with effect from 2019-2020)

DEPARTMENT OF PHYSICS

Dr. Ambedkar Government Arts College

(Autonomous)

Vyasarpadi, Chennai – 600 039

Dr. AMBEDKAR GOVERNMENT ARTS COLLEGE



(AUTONOMOUS)

VYASARPADI, CHENNAI - 600 039

(AFFILIATED TO UNIVERSITY OF MADRAS)

Choice Based Credit System (CBCS)

B.A. / B.Sc. / B.Com. / B.B.A. DEGREE COURSE

(With effect from the Academic year 2019 – 2020)

Dr. Ambedkar Government Arts college (Autonomous) offers the semester System of education with credits for UG courses. Credit is related to the number of hours a teacher teaches a particular subject as well as to the number of hours a student spends learning a subject or carrying out an activity. In the semester system of study, every academic year is divided into two semester sessions. Each semester will have a minimum of 90 working days and each day will have 5 working hours.

Differential weightage is given according to the content and duration of the course in the curriculum design. Each course is designed variously under lectures/ tutorials/ laboratory/ work/ seminar/ project work/ practical training/ viva, etc., to facilitate effective teaching and learning and the credits are assigned accordingly depending on the content and the specialization.

Regulations

(Effective from the Academic year 2019-2020 onwards)

1. Eligibility for Admission:

Candidates for admission to the Degree of Bachelor of Science, Arts and Commerce shall be required to have passed the Higher Secondary Examination (Academic or Vocational stream), conducted by the Government of Tamil Nadu, or an examination accepted as equivalent thereto by the Syndicate of the University of Madras.

2. Eligibility for the award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than three academic years, passed the examination of all the six semesters prescribed earning 140 credits including 2 credits for Environmental Studies, 2 credits for Value Education and 1 credit for the compulsory Extension Services prescribed.

3. Duration

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semester, the second academic year the third and the fourth semester and the third academic year the fifth and sixth semester respectively.

The odd semester shall consist of the period from June to November of each academic year and the even semester from December to April of each academic year. There shall be not less than 90 working days for each semester.

4. The CBCS System

All Programmes (named after the Core subject) mentioned earlier are based on Choice Based Credit System (CBCS). It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

5. Course of Study

The UG programme consists of several courses. The term ‘course’ is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject matter of a “paper” in the conventional sense.

The following are the various categories of Courses suggested for the UG programmes. Language Course (LC) (Tamil), English Language Course (ELC), Core Course (CC), Allied Courses (AC), Allied Practical (ACP), Elective Courses (EC) (instead of Applied Course in the curriculum followed earlier), Non-major elective courses (NME), Skill based Elective courses (SS), Environmental studies (ES), Value Education (VE) and Extension Activity (EA).

6. Credits

The term ‘Credit’ refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. For instance, the course with six hour per week is assigned four credits, course with four / five hour per week is assigned three credits and course with two hour per week is given two credits. However, in no instance the credits of a course can be greater than the hours allotted to it. The total minimum credits, required for completing the UG program is 140.

Study Components	No.of Courses	Credit per Course	Total Credits
Part-I Tamil/ Other Languages	2+2=4	3	12
Part-II English	2+2=4	3	12
Part-III Core Courses	13-15	4-5	60
Allied Courses	4	5	20
Project/Electives with three Course	3	5	15
Part-IV Those who have not studied Tamil upto XII Standard and taken a non-Tamil Language under Part-I shall take Tamil comprising of two courses(level will be at 6 th			

standard)			
b) Those who have studied Tamil upto XII Standard and taken a non-Tamil Language under Part-I shall take advanced Tamil comprising of two courses			
c) Others who do not come under a+b can choose non-major elective comprising of two courses			
2. Skill based courses (Elective)	1+1=2	2	4
3. Environmental Studies	2+2=4	3	12
4. Value Education	1	2	2
	1	2	2
Part-V			
Extension Activities	1	1	1
Total			140

B.Sc., PHYSICS

Scheme of Examination under Choice Based Credit System (For candidates admitted from 2019-2020 onwards)

Sem.	Sub Code	Course Title	InstHr s/ week	Cre dit	Exa m Hrs	Mar ks	
						I n t	E x t
I	19UAFT A1	Language Course -1	6	3	3	25	75
	19UAFE N1	English Course -1	4	3	3	25	75
	19UAPH C1	Mechanics and Properties of Matter	6	4	3	25	75
		Major	3	-	**	4	6

		Practical I				0	0
	19UAMA A1	Allied Subject I Allied Mathemat ics I	7	5	3	2 5	7 5
	19UAPH N1	Non- major elective I (Fundame ntals of Physics-I)	2	2	3	2 5	7 5
	19UASB E1	Essentials of Language and Communi cation	2	3	3	4 0	6 0
II	19UBFT A2	Language Course -2	6	3	3	2 5	7 5
	19UBFE N2	English Course -2	4	3	3	2 5	7 5
	19UBPH C1	Heat, Thermody namics and Sound	6	4	3	2 5	7 5
		Major Practical I	3	4	3	4 0	6 0
	19UBPH C2	Allied Subject I Allied Mathemat ics II	7	5	3	2 5	7 5
	19UAMA A2	Non- major elective II (Fundame ntals of Physics- II)	2	2	3	2 5	7 5
	19UBSBE	Essentials	2	3	3	4	6

	2	of Spoken and Presentati on skill				0	0
		Total credits for I & II semester = 44 credits					
Sem.	Sub Code	Course Title	Inst Hrs/ week	Cre dit	Exa m Hrs	Marks	
						Int	E x t
III	19UC FTA3	Language Course -3	6	3	3	25	75
	19UC FEN3	English Course -3	4	3	3	25	75
	19UC PHC1	Optics and Spectro scopy	6	4	3	25	75
		Major Practic al II	3	-	**	40	60
	19CC CHA1	Allied Subject II Allied Chemis try I	4	5	3	25	75
		Allied Chemis try Practic al	3	-	**	40	60
	19CE VS1	Enviro nmenta l Studies	2	2	3	25	75
	19UC	Persona	2	3	3	40	6

	SBE3	lity Enrich ment					0
IV	19UD FTA4	Langua ge Course -4	6	3	3	25	7 5
	19UD FEN4	English Course -4	4	3	3	25	7 5
	19UD PHC1	Atomic Physics	6	4	3	25	7 5
	19UD PHC2	Major Practic al II	3	4	3	40	6 0
	19UD CHA2	Allied Paper II Allied Chemis try II	4	5	3	25	7 5
	19UD CHA3	Allied Chemis try Practic al	3	-	3	40	6 0
	19UD VBE1	Value educati on	2	2	3	25	7 5
	19UD SBE4	Compu ter basics & office automa tion	2	3	3	40	6 0
	19UD EXT1	Extensi on Activit y	-	1	-	-	-
		Total credits for III & IV					

		semester r= 45 credits					
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Sem	Sub Code	Course Title	InstHrs/ week	Credit	Exam Hrs	Marks	
						Int	Ext
V	19UEPHC1	Electricity and Electromagnetism	4	4	3	25	75
	19UEPHC2	Analog and digital Electronics	4	4	3	25	75
	19UEPHC3	Classical and Statistical Mechanics	4	4	3	25	75
	19UEPHC4	Relativity and Quantum Mechanics	4	4	3	25	75
		Major Practical III	3	-	**	40	60
		Major Practical IV	3	-	**	40	60
		Major Practical V	3	-	**	40	60
	19UEPHE1	Elective Course 1 (Energy Physics)	5	5	3	25	75
VI	19UFPHC1	Nuclear Physics	5	4	3	25	75
	19UFPHC2	Solid State Physics	6	4	3	25	75
	19UFPHC3	Major Practical III	3	4	3	40	60
	19UFPHC4	Major Practical IV	3	4	3	40	60
	19UFPHC5	Major Practical V	3	4	3	40	60
	19UFPHE1	Elective Course 2 (Mathematical Physics)	5	5	3	25	75
	19UFPHE2	Elective Course 3 (Microprocessor Fundamentals)	5	5	3	25	75
Total credits for IV & V semester= 51 credits							
Total credits for 3years = 140 credits							

** - Practical Examination at the end of even semester

ALLIED PHYSICS

For B.Sc., Mathematics, Chemistry and Computer Science Students

	Allied Physics – I
	Allied Physics – II
	Allied Physics Practical

NON-MAJOR ELECTIVE COURSE

I SEMESTER (Any one subject of the following NME chosen by the candidate)		II SEMESTER (Any one subject of the following NME chosen by the candidate)	
Sub. Code	Non Major Elective	Sub. Code	Non Major Elective
	Fundamentals of Physics -I		Fundamentals of Physics -II
	Energy Physics		Laser Physics

CORE COURSE ELECTIVES

V SEMESTER (Any one subject of the following CCE chosen by the candidate)		VI SEMESTER (Any two subjects of the following CCE chosen by the candidate)	
Sub. Code	Core Course Elective	Sub. Code	Core Course Elective
	Energy Physics		Mathematical Physics
	Nanophysics		Microprocessor Fundamentals
	Spectroscopy		Optoelectronics
	Computer Programming in C++		Medical Physics

SEMESTER – I

CORE COURSE - I

Subject Code: **Credits : 4**

MECHANICS AND PROPERTIES OF MATTER

Unit 1 : Impulse and Impact

Impulse – impact – Laws of impact – direct impact and oblique impact between two smooth spheres – loss of kinetic energy – motion of two interacting bodies – reduced mass.

Rigid body dynamics

Compound pendulum – theory – determination of g and k – center of mass – velocity and acceleration of centre of mass – determination of motion of individual particle – system of variable mass.

Unit 2 : Centre of gravity and centre of pressure

Centre of gravity of solid and hollow tetrahedron, solid and hollow hemisphere – Centre of pressure – vertical rectangular lamina – vertical triangular lamina.

Hydrodynamics

Equation of continuity of flow – Venturimeter – Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theorem and its applications.

Unit 3 : Elasticity

Hooke's Law – Stress – Strain - Elastic constants – Expressions for Poisson's ratio in terms of elastic constants – workdone in stretching and twisting a wire – rigidity modulus by static torsion – torsional pendulum – rigidity modulus and moment of inertia.

Unit 4 : Bending of beams

Cantilever – expression for bending moment – Experiment to find Young's modulus – Non uniform bending – Experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.

Unit 5 : Fluid dynamics

Surface tension-Definition – Excess of pressure over curved surface – Application to spherical and cylindrical drops and bubbles – variation of surface tension with temperature – Jaeger's method. Viscosity-Definition – Coefficient of viscosity – Rate of flow of liquid in a capillary tube – Poiseuille's formula

Books for Study

1. Mechanics – Part I and II by Narayanamoorthy, National Publishing Company.
2. Mechanics by D.S.Mathur, S.Chand & Co., 2nd Edition (2001).
3. Mechanics by P. Duraipandian, LaxmiDuraipandian, MuthamizhJayapragasam, S.Chand & Co., New Delhi (1988).
4. Properties of Matter by BrijLal and N.Subramaniam, S. Chand & Co., New Delhi (1994).
5. Properties of Matter by R.Murugesan, S. Chand & Co., New Delhi (2001).

Books for Reference

1. General Properties of Matter by C.J. Smith, Orient Longman Publishers (1960).
2. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).
3. Mechanics and General Properties of Matter by P.K. Chakrabarthy, Books and Allied (P) Ltd. (2001).
4. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., New Delhi (1982).

Website:

nptetl.iitm.ac.in

SEMESTER – II

CORE COURSE - II

Subject Code: Credits : 4

HEAT, THERMODYNAMICS AND SOUND

Unit 1 :Thermometry and Calorimetry

Specific heat capacity – Specific heat capacity of solids – Dulong and Petit's law – Specific heat capacity of liquid – method of mixtures – Barton's correction – Specific heat capacity of gases – C_p and C_v by Regnault's method

Low temperature physics :

Joule-Kelvin effect – porous plug experiment – Linde's method of liquefying air

Unit 2: Conduction and Radiation

Thermal conductivity – rectilinear flow of heat – thermal conductivity of a good conductor – Forbe's method – thermal conductivity of a bad conductor – Lee's disc method – radiation – blackbody radiation – Wien's law – Stefan's law – Newton's law of cooling from Stefan's law

Unit 3 : Thermodynamics

Thermodynamic equilibrium – zeroth law of thermodynamics – first law of thermodynamics – Reversible and irreversible processes – second law of thermodynamics- Heat engine – Carnot's engine – Carnot's theorem – thermodynamics scale of temperature- Entropy – entropy and available energy – temperature – entropy diagram for Carnot's cycle - III Law of thermodynamics – Nernst's heat theorem-Maxwell's thermodynamic relations

Unit 4: Sound

Simple Harmonic Motion –Composition of two S.H.M in a straight line-at right angles-Lissajous's figures-Free, Damped, Forced vibrations - Resonance -Fourier theorem-application

Laws of transverse vibration of strings - Sonometer-Determination of AC frequency using sonometer - Determination of frequency using Melde's apparatus-Decibels - Intensity levels - decibel-noise pollution

Unit 5 :Ultrasonics

Ultrasonics – production – piezo electric crystal method – magnetostriction method – applications.Acoustics of buildings – reverberation – Absorption coefficient – Sabine's formula – Acoustics aspects of halls and auditoriums.

Books for study

1. Heat and Thermodynamics by D.S.Mathur, 3rd edition Sulthan Chand & Sons, New Delhi (1978).
2. Heat and Thermodynamics by Brijlal and N. Subramanyam, S.Chand& Co, New Delhi (2000).
3. Heat by Narayanamoorthy and KrishnaRao, Triveni Publishers, Madras (1969).
4. Text book of Sound by V.R.Khanna and R.S.Bedi, 1st edition, Kedharnaath Publish & Co, Meerut (1998).
5. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house, New Delhi (2001).
6. Text book of Sound by Ghosh, S.Chand& Co, New Delhi (1996).

Books for Reference

1. Heat and Thermodynamics by Zemansky, McGraw – Hill Book Co. Inc., New York.
2. Fundamentals of Physics by ResnickHalliday and Walker, 6th edition, , John Willey and Sons, Asia Pvt.Ltd., Singapore.
3. Fundamentals of Thermodynamics by Carroll M.Leonard, Prentice-Hall of India (P) Ltd., New Delhi (1965).

4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, 8th edition, S.Chand & Co. Ltd., New Delhi (1976).
5. Principles of Thermodynamics by Jin Sheng Hsieh, 1st edition, McGraw – Hill Kogakusha Ltd., Tokyo (1975).
6. Thermodynamics by Warren Giedt, 1st edition, Van Nostrand Reinhold Company, New York (1971).

Website:

nptel.iitm.ac.in

CORE COURSE – III [Practical]

Subject Code: Credits : 4

**MAJOR PRACTICAL – I
(At the end of the Second semester)**

1. Young's modulus – Non-uniform bending – Pin & microscope
2. Young's modulus – Non-uniform bending – Optic lever & telescope
3. Rigidity modulus – Torsion pendulum (without identical masses)
4. Rigidity modulus and moment of inertia – Torsion pendulum (With identical masses)
5. Surface tension and interfacial surface tension – drop weight method
6. Comparison of co-efficient of viscosities of two liquids – Graduated burette
7. Laser-Numerical aperture and Particle size determination
8. Sonometer – Determination of frequency of tuning fork
9. Specific heat capacity of a liquid – Newton's law of cooling
10. Thermal conductivity of a bad conductor – Lee's disc method
11. Determination of wavelength using diode laser source
12. Spectrometer – refractive index of a solid prism
13. P.O. Box – specific resistance of a coil
14. Potentiometer – Internal resistance of a cell
15. Potentiometer – calibration of low range voltmeter

Note : Use of Digital balance is permitted

SEMESTER – III

CORE COURSE - IV

Subject Code: **Credits : 4**

OPTICS AND SPECTROSCOPY

Unit 1 : Geometrical Optics

Spherical aberration in lenses - methods of minimizing spherical aberration - condition for minimum spherical aberration in the case of two lenses separated by a distance - Chromatic aberration in lenses - Condition for achromatism of two thin lenses (in and out of contact) - Dispersion produced by a thin prism - Combination of prisms to produce - Dispersion without deviation - Deviation without dispersion.

Unit 2 : Interference

Analytical treatment of interference - expression for intensity - condition for maxima and minima in terms of phase and path difference - Airy's disk - determination of diameter of thin wire - Michelson's interferometer - theory - applications - determination of wavelength; thickness of thin transparent material and resolution of interferometer.

Unit 3 : Diffraction

Fresnel diffraction - diffraction at a circular aperture and narrow wire. Fraunhofer diffraction - single slit - double slit - (simple theory). Plane diffraction grating - Determination of wavelengths using grating - normal incidence - oblique incidence (theory). Dispersive power of a grating. Resolving power of grating - Difference between resolving power and Dispersive power.

Unit 4 : Polarisation

Double refraction - Nicol prism - polarizer and analyzer - Huygen's explanation of double refraction in uniaxial crystals - Quarter wave plate and Halfwave plate - plane, elliptically and circularly polarized light - production and detection - optical Activity - Fresnel's explanation of optical activity - specific rotatory power - determination using Laurent's half shade polarimeter.

Unit 5: Spectroscopy

Introduction to spectroscopy - Electromagnetic spectrum – characteristics of electromagnetic radiation - quantization of energy - regions of the spectrum – classification of molecules – rigid rotator - vibrational spectroscopy – harmonic oscillator - Raman effect - experimental set up - Characteristics of Raman lines.

Books for Study :

1. A Text book of Optics by Subrahmanyam N., Brij Lal and M.N. Avadhanulu, S.Chand & Co., New Delhi (2006).
2. Optics by Khanna D.R. & Gulati H.R., S.Chand & Co., New Delhi (1979).

3. Optics and Spectroscopy by R.Murugeshan and KiruthigaSivaprasath, S. Chand & Co., New Delhi (2006).
4. Molecular structure and spectroscopy by Aruldas, Prentice Hall of India Pvt. Ltd., New Delhi (2005).

Books for Reference :

1. Fundamentals of Physics, by D.Halliday, R. Resnick and J. Walker, Wiley, 6th Edition, New York (2001).
2. Optics by Ajay Ghatak, Tata McGraw-Hill publishing Co. Ltd., New Delhi(1998).
3. Spectroscopy by GurdeepChatwal, Sham Anand, Himalaya Publishing House(1990).

Website:

nptel.iitm.ac.in

SEMESTER – IV

CORE COURSE - V

Subject Code: Credits : 4

ATOMIC PHYSICS

Unit I:BAND THEORY OF SOLIDS

The free electron theory of metals – expressions for electrical conductivity – thermal conductivity – Wiedman-Franz's law-Hall effect-magneto resistance-determination of electronic charge – Millikan's oil drop method – electron microscope – Band theory of solids – classification of solids on the basis of band theory.

Unit II:POSITIVE RAYS:

Discovery-properties- analysis – Thomson's parabola method – Aston's mass spectrograph – Bainbridge's mass spectrograph – Dempster's mass spectrograph – Dunnington's method of determining e/m .

Unit III : ATOMIC STRUCTURE

Early atomic spectra-Thomson model-Alpha particle scattering-Rutherford's nuclear model-drawbacks-Bohr atom model –Bohr's interpretation of the Hydrogen spectrum-correction for nuclear motion-evidences in favour of Bohr's theory-Ritz combination principle-correspondence principle-Sommerfeld's relativistic atom model-drawbacks- the vector atom model – Quantum numbers associated with the vector atom model — the Pauli's exclusion principle – periodic classification of elements

Unit IV:FINE STRUCTURE OF SPECTRAL LINES

Coupling schemes-L-S Coupling-j-j Coupling- Hund rules- magnetic dipole moment due to orbital motion of the electron- due to spin of the electron - Stern and Gerlach experiment-spin-orbit coupling-optical spectra-spectral terms-spectral notation- selection rules- intensity

rules- interval rule- fine structure of sodium D line- hyperfine structure- Normal Zeeman effect- theory and experiment- quantum mechanical explanation - Larmor's theorem- Anomalous Zeeman effect- Paschen –Bach effect-Stark effect.

Unit V:X-Rays and Photo Electric Effect

Production of X-rays – properties-absorption of X-rays – X-ray absorption edges- Bragg's law – Bragg's X-ray spectrometer –the powder crystal method –Laue's method – Rotating crystal method –X-ray spectra- continuous spectra- characteristic spectra-Moseley's law -importance–width of spectral lines-Doppler broadening-collision broadening-X-ray Detectors-scintillation detector-semiconductor detectors Compton effect- theory and experimental verification.

Photo Electric Effect-Einstein's photoelectric equation-photoelectric cells-photo emissive cells-photovoltaic cells-photoconductive cells-applications of photoelectric cells

Books for Study

1. Modern Physics by R. Murugesan, KiruthigaSivaprasath, S. Chand & Co., New Delhi(2008).
2. Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal. Sultan Chand & Sons Publication, 7th Edition, New Delhi(1991).
3. Atomic Physics by J.B. Rajam, S. Chand & Co., 20th Edition, New Delhi (2004).
4. Atomic and Nuclear Physics by N. Subrahmanyam and BrijLal, S. Chand & Co. 5th Edition, New Delhi(2000).

Book for Reference :

1. Modern Physics by J.H. Hamilton and Yang, McGraw-Hill Publication, (1996).
2. Concepts of Modern Physics by A. Beiser, Tata McGraw-Hill, New Delhi (1997).
3. Fundamentals of Physics by D.Halliday, R.Resnick and J. Walker, Wiley, 6th Edition, New York(2001).
4. Modern Physics by Kenneth S.Krane, John Willey & sons, Canada (1998).

CORE COURSE – VI [Practical]

Subject Code: **Credits : 4**

Major Practical - II **(Practical Examination at the end of Fourth semester)**

- 1.Young's modulus - cantilever - depression - Static method - Scale and telescope
- 2.Young's modulus - cantilever oscillations - (Dynamic method)
- 3.Young's modulus-Uniform bending- single optic lever and telescope
4. Rigidity modulus - Static torsion
- 5.Compound pendulum - g and k
- 6.Melde's String – Frequency, Relative Density of a solid and liquid
- 7.Spectrometer- i-d Curve
- 8.Spectrometer - Grating N and λ - normal incidence method
- 9.Spectrometer - Grating N and λ - minimum deviation method

10. Spectrometer-Determination of refractive index of liquid-hollow prism
11. B_H curve - Hysteresis
12. Carey Foster bridge - resistance of a coil
13. Potentiometer - Ammeter calibration
14. Figure of merit of galvanometer (Spot Galvanometer Or Table Galvanometer)
15. Airwedge- Determination of thickness of a thin wire
16. Sonometer- Frequency of AC mains using steel and brass wire
 - *C.R.O. Study of wave forms - Lissajou's figures - frequency determination
 - *Study of resistors, Choke, capacitors and transformer
 - *Construction of battery eliminator - various voltages - with filter circuit and IC voltage regulator
 - *Two transistor Radio receiver
 - *Not for Examination

SEMESTER – V

CORE COURSE - VII

Subject Code: Credits : 4

ELECTRICITY AND ELECTROMAGNETISM

UNIT-1 :MAGNETIC EFFECT OF ELECTRIC CURRENT

Magnetic flux and magnetic induction- BiotSavart law- magnetic induction at a point due to a straight conductor carrying current - magnetic induction at a point on the axis of a circular coil carrying current- amperes circuital law-magnetic field inside a long solenoid- Lorentz force on a moving charge- direction of force-torque on a current loop in a uniform magnetic field -Moving coil Ballistic galvanometer-theory -experiment to find charge sensitivity and absolute capacity of a capacitor

UNIT-II: THERMAL AND CHEMICAL EFFECT OF ELECTRIC CURRENT

Thermoelectricity- Seebeck effect- laws of thermo e.m.f— measurement of thermo e.m.f using potentiometer-Peltier effect-demonstration—Thomson effect- demonstration - thermodynamics of thermo couple –thermo electric diagram –uses

Faradays laws of electrolysis- electrical conductivity of an electrolyte-specific conductivity- Kohlrausch's bridge method of determining the specific conductivity of an electrolyte -Arrhenius theory of electrolytic dissociation- Accumulators-lead accumulators-alkali accumulator-standard cadmium cell

UNIT-III: ELECTROMAGNETIC INDUCTION

Faraday's laws of electromagnetic induction-self induction –self inductance of a long solenoid -mutual induction-mutual inductance between two co-axial solenoids-experimental determination of mutual inductance –coefficient of coupling - eddy currents-uses - Earth inductor-uses-search coil- induction coil and its uses

UNIT-IV: AC AND DC CIRCUITS

Growth and decay of current in LC,LR and CR circuits with d.c.voltages - determination of high resistance by leakage –growth and decay of charge in LCR circuit-

conditions for the discharge to be oscillatory –frequency of oscillation.

Alternating Current-Resistance in an AC circuit-Inductance in an AC circuit-Capacitance in an AC circuit-AC through an inductance and resistance in series- capacitance and resistance in series – LCR series resonance circuit -sharpness of resonance-parallel resonance circuit -power in an AC circuit-power factor.

UNIT-V: MAXWELL'S EQUATION & ELECTROMAGNETIC WAVES

Introduction- Maxwell's equations- -Displacement current- Poynting vector-Electromagnetic waves in free space-Hertz experiment for production and detection of EM waves.

Books for study

1. R. Murugesan, Electricity and Magnetism (2008) S Chand & Co, New Delhi
2. BrijLal&Subramanyam, Electricity and Magnetism,(2005) RatanPrakashanMandir Publishers, Agra
3. M.Narayanamurthy&N.Nagarathnam, Electricity & Magnetism, NPC pub., Revised edition.

Books for Reference

1. Electricity and Magnetism -D.N.Vasudeva (Twelfth revised edition)
2. Electricity and Magnetism - K.K.Tiwari (S.Chand&Co.)
3. Electricity and Magnetism -E.M.Pourcel,Berkley Physics Course, Vol.2 (McGraw-Hill)
4. Electricity and Magnetism -Tayal (Himalalaya Publishing Co.)
5. D.Halliday, R.Resnick and J.Walker, Fundamentals of Physics – Electricity and Magnetism (2011), Wiley India,Pvt Ltd
6. David J. Griffith, Introduction to Electrodynamics, (2012) PHI, New Delhi

Web Site :

<http://www2.warwick.ac.uk/fac/sci/physics/teach/module-home/px207>.
[www.core.org.cn/ocw/web/physics/8-311/spring 2004/lecture notes](http://www.core.org.cn/ocw/web/physics/8-311/spring2004/lecture%20notes).
nptel.iitm.ac.in

SEMESTER – V

CORE COURSE - VIII

Subject Code: Credits : 4

ANALOG AND DIGITAL ELECTRONICS

Unit I: Semiconductor devices

PN junction theory - V-I characteristics of a PN junction diode - Zener diode - equivalent circuit - voltage regulator -Field effect Transistor FET-MOSFET- UJT-SCR -characteristics - FET as a VVR-UJT relaxation oscillator-SCR as a switch and rectifier

Unit II:Transistor Amplifier, Oscillators and Multivibrator

Transistor - Different modes of operations-CB mode &CE mode- RC coupled amplifier – Emitter follower. Feedback principle -effect negative feedback-and Barkhausen criterion -

Phase shift and Wien Bridge oscillators using transistors –Expression for frequency- Multivibrators-Astable, Monostable and Bistable multi vibrators using transistors - Schmitt trigger

Unit III: Operational Amplifier & Timer

Operational Amplifier- characteristics-parameters-applications- Inverting amplifier - Non inverting amplifier - Adder - Subtractor - Integrator – Differentiator- Solving simultaneous equations-comparator -square wave generator -Wien bridge oscillator - 555 timer, block diagram & working-astable & monostable multivibrator -Schmitt trigger

Unit IV: Digital Fundamentals

Number Systems and Conversions -BCD Code - Gray code - 1's and 2's complements – Basic logic gates - NAND, NOR and EX-OR gates - NAND and NOR as Universal Building blocks - Laws and theorems of Boolean algebra – NAND-NAND circuits - Karnaugh's map- SOP and POS- applications-Half adder-Full adder-Half subtractor-full subtractor.

Unit V :Sequential Logic

RS, Clocked RS, D, J-K and J-K Master-Slave Flip-flop - Shift registers and Counters- Multiplexers and Demultiplexers – Decoders and Encoders - Memory Circuits - D/A and A/D converters

Books for Study

1. Hand Book of Electronics by Gupta and Kumar - PragatiPrakashan – Meerut(2002).
2. Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co.(2006).
3. Electronics by M. Arul Thalapathi, ComptekPublishers(2005).
4. Elements of Electronics by M.K.Bagde and Singh S.P., S. Chand & Co., NewDelhi(1990).
5. Applied Electronics by A. Subramanyam – National Publishing Co.(1997)
6. OP - AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, PrenticeHall of India(1994).
7. Digital Principles and Application by Malvino Leach, Tata McGraw Hill, 4th Edition(1992).
8. Digital Fundamentals by Thomas L. Floyd, Universal Book Stall, New Delhi(1998).
9. Introduction to Integrated Electronics by V.Vijayendran, S. Viswanathan (Printersand Publishers) Pvt. Ltd., Chennai(2005).

Books for Reference

1. Electronic Devices by Mittal.G.K., G.K. Publishers Pvt. Ltd., (1993).
2. Basic Electronics by B.L. Theraja, S. Chand & Co., (2008).
3. Solid State Electronics by Ambrose and Vincent Devaraj, Meera Publication.
4. Applied Electronics by R.S. Sedha, S. Chand & Co.(1990).
5. Digital Electronics by Practice Using Integrated Circuits - R.P.Jain - Tata McGrawHill(1996).
6. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain - New AgeInternational (P) Ltd.(2003).
7. Electronics - Analog and Digital by I.J. Nagrath - Prentice - Hall of India, NewDelhi(1999).
8. Integrated Electronics by J.Millman and C.Halkias, Tata McGraw Hill, New Delhi(2001)

SEMESTER – V

CORE COURSE - IX

Subject Code: Credits : 4

CLASSICAL AND STATISTICAL MECHANICS

UNIT I: Mechanics of a System of Particles

External and internal forces, centre of mass-Conservation of linear momentum-Conservation of angular momentum-Conservation of energy-work-energy theorem-Conservative forces-examples-Constraints-Types of constraints-Examples-Degree of freedom-Generalized coordinates (transformation equations)- Generalized velocities-Generalized Momentum.

UNIT II:Lagrangian Formulations

Principle of virtual work, D'Alembert's principle, Lagrange's equation of motion for conservative and non conservative systems-Simple applications-simple pendulum-Atwood's machine-compound pendulum- Hamilton's principle-Deduction of Lagrange's equation of motion from Hamilton's principle-Deduction of Hamilton's principle from D'Alembert's principle.

UNIT III: Hamiltonian Formulations

Phase space-The Hamiltonian function H -Hamilton's Canonical equation of motion-Physical significance of H- Deduction of Canonical equation from a variational principle-Applications-Harmonic oscillator-Planetary motion-Compound pendulum

UNIT IV: Classical Statistics

Micro and macro states-The μ -space and γ space-fundamental postulates of statistical mechanics-Ensembles-different types -Thermodynamical probability-entropy and probability-Boltzmann's theorem- Maxwell-Boltzmann statistics- Maxwell-Boltzmann energy distributive law- Maxwell-Boltzmann velocity distributive law.

UNIT V: Quantum Statistics

Development of Quantum statistics- Bose - Einstein and Fermi - Dirac statistics - Derivation of Planck's radiation formula from Bose – Einstein statistics - Free electrons in metal- Fermi gas-Difference between classical and quantum statistics

TEXT BOOKS:

1. J.C. Upadhyaya, July 2005, **Classical Mechanics**, Published by Himalya Publishing House, Mumbai
2. Brijlal&Subramaniam, Reprint 1998, **Heat & Thermodynamics**, S. Chand & Company Ltd
3. Agarwal, '**Statistical Physics**' S.Chand& co New Delhi 1996

REFERENCES:

1. Gupta,B.D., Satyaprakash, 1991, Classical Mechanics, 9th ed., KaternathRamnath Publ., Meerut
2. Gupta, Kumar, Sharma, 2005, **Classical Mechanics**, PragatiPrakashan Publ., Meerut.
3. Murray R.Spiegel, 1981, Theoretical Mechanics, Schaum's outline series, McGraw Hill Publ. Co., New Delhi.

SEMESTER – V

CORE COURSE - X

Subject Code: **Credits : 4**

RELATIVITY AND QUANTUM MECHANICS

Unit I: Relativity

Frames of reference - Galilean transformation - Michelson - Morley experiment - Postulates of special theory of relativity - Lorentz transformation - length Contraction – time dilation - Relativity of simultaneity - addition of velocities - variation of mass with velocity– Mass energy relation - Elementary ideas of general relativity.

Unit II: Wave Nature of Matter

Phase and group velocity - wave packet - expression of De Broglie's wave length - Davisson and Germer's experiment - G.P.Thomson's experiment - Heisenberg's uncertainty principle and its consequences.

Unit III: Schrodinger Equation

Inadequacy of classical mechanics - Basic postulates of quantum mechanics - Schrodinger equation - Properties of wave function - Probability interpretation of wavefunction - linear operators - self adjoint operators - expectation value - eigenvalues and eigenfunctions.

Unit IV: Angular Momentum in Quantum Mechanics

Orbital angular momentum operators and their commutation relations - separation of three dimensional Schrodinger equations into radial and angular parts - Elementary ideas of spin angular momentum of an electron - Pauli matrices.

Unit V: Solutions of Schrodinger Equation

Free particle solution - Particle in a box - Potential well of finite depth (one dimension) - linear harmonic oscillator - rigid rotator and hydrogen atom.

Books for Study

1. A Text book of Quantum mechanics by P.M.Mathews and S.Venkatesan, TataMcGraw - Hill, New Delhi(2005).
2. Quantum Mechanics by V.K.Thankappan, New Age International (P) Ltd.Publishers, New Delhi(2003).
3. Quantum mechanics by K.K.Chopra and G.C. Agrawal, Krishna PrakasamMedia(P) Ltd., Meerut First Edition(1998).
4. Modern Physics by R. Murugesan and KiruthigaSivaprasath, S. Chand &Co.,(2008).

Books for Reference

1. Mechanics and Relativity by BrijlalSubramanyam, S.Chand& Co., New Delhi, (1990).
2. Concepts of modern physics by A.Beiser. Tata McGraw - Hill, 5thedition, NewDelhi(1997).
3. Introduction to quantum mechanics by Pauling and Wilson, McGraw – Hill.
4. Quantum mechanics by A.Ghatak and Loganathan, Macmillan India Pvt. Ltd.

SEMESTER – VI

CORE COURSE - XI

Subject Code: **Credits : 4**

NUCLEAR PHYSICS

UNIT I: Properties and structure of Nuclei

General properties of nucleus- binding energy – BE/A curve - significance -proton electron theory- proton neutron theory -Nuclear forces –characteristics –Meson theory of nuclear forces – Yukawa Potential- Nuclear models.

UNIT II:Radio Activity

Fundamental laws of radio activity –theory of α , β and γ decay- properties of alpha, beta and gamma rays - neutrino and its properties-electron capture. - nuclear isomers- Mossbauer effect - applications- Radio carbon dating- radio isotopes – uses.

UNIT III: Nuclear Reactions

Kinematics of nuclear reaction-Nuclear fission –Nuclear fusion – Nuclear reactor- uses - atom bomb - hydrogen bomb-fusion reactor –plasma confinement –artificial transmutation-Q value of nuclear reaction-types of nuclear reaction

UNIT IV:Nuclear Detectors and Particle Accelerators

Neutron sources and properties- Detectors-G.M.Counter-scintillation counter-bubble chamber-Wilson cloud chamber-Accelerators-cyclotron-synchrocyclotron-betatron-synchrotrons

UNIT V:Cosmic Rays and Elementary Particles

Cosmic rays-introduction-discovery-latitude, altitude and azimuth effects-longitudinal effect-north –south effect-seasonal and diurnal changes-primary and secondary cosmic rays-nature of cosmic rays- cosmic ray showers-Van Allen belt- origin of cosmic radiation.

Elementary particles-introduction-particles and antiparticles-antimatter-the fundamental interaction-elementary particle quantum numbers-conservation laws and symmetry-the quark model

Books for study

1. Atomic and Nuclear Physics by N. Subrahmanyam and Brijlal, S Chand &Co.,New Delhi (1996).
2. Nuclear Physics by Tayal D.C., Himalaya Publishing House, Mumbai(2006).
3. Nuclear Physics by R.C.Sharma, K.Nath& Co., Meerut (2000)
4. Nuclear Physics by Irving Kaplan, Narosa Publishing house, New Delhi.

Books for Reference

1. Nuclear Physics by R.R.Roy and B.P.Nigam, New Age International (P) Ltd., NewDelhi(1997).
2. Fundamentals of Elementary Particle Physics by Longo, McGraw-Hill.
3. Nuclei and Particles by Serge., W.A. Benjamin, USA
4. Elements of Nuclear Physics by ML Pandya and RPS Yadav, Kedarnath Ram Nath,Meerut.

Web Site

<http://faraday.physics.utoronto.ca/GeneralInterest/D.Bailey/SubAtomic/Lectures/Lectnptel.iitm.ac.in>

SEMESTER – VI

CORE COURSE - XII

Subject Code: Credits : 4

SOLID STATE PHYSICS

UNIT I: Bonding in Solids

Types of bonds in crystals - Ionic, covalent, Metallic, Vander waal's and Hydrogen Bonding - Bond energy of sodium chloride molecule - variation of inter atomic force with inter atomic spacing - cohesive energy - cohesive energy of ionic solids

UNIT II: Crystal Structure and Crystal Diffraction

Crystal Lattice - Primitive and unit cell - seven classes of crystal - Bravais Lattice - Miller Indices - Structure of crystals -- Simple cubic, Face centered cubic, Body centered cubic and Hexagonal close packed structure - Sodium Chloride, Zinc Blende and Diamond Structures.

Crystal Diffraction – Bragg's law - Experimental methods - Laue method, powder method

UNIT III: Magnetic Properties

Spontaneous Magnetization – classical Theory of Diamagnetism – Weiss theory of Paramagnetism – Ferromagnetic domains – Bloch wall – Basic ideas of anti-ferromagnetism – Ferrimagnetisms – Ferrites in computer Memories.

UNIT IV: Dielectric Properties

Band theory of solids – classification of insulators, Semiconductors, conductors – intrinsic and extrinsic semiconductor – Carrier concentration for electron - Polarization – frequency and temperature effects on polarization - dielectric loss - Clausius-Mosotti relation - determination of dielectric constants.

UNIT V: Super Conductivity

Introduction - General Properties of Superconductors - effect of magnetic field - Meissner effect - effect of current - thermal properties - entropy - specific heat - energy gap - isotope effect - Type-I and Type-II Superconductors - Explanation for the Occurrence of Super Conductivity - BCS theory - Application of Superconductors - High T_c superconductors.

Books for Study

1. Materials Science by M. Arumugam, Anuradha Agencies Publishers., (2002).
2. Solid State Physics by R L Singhal, Kedarnath Ram Nath & Co., Meerut (2003).
3. Introduction to Solid State Physics by Kittel, Wiley Eastern Ltd (2003).
4. Materials Science and Engineering by V. Raghavan, Prentice Hall of India Private Limited, New Delhi (2004).

Books for Reference

1. Solid State Physics by S.O. Pillai, New Age International (P) Ltd., (2002).
2. Solid State Physics by A. J. Dekker, Macmillan India (1985).
3. Solid State Physics by HC Gupta, Vikas Publishing House Pvt. Ltd., New Delhi

Web Site

<http://folk.uio.no//dragos//solid/fys230-Exerciser.html>.

<http://www.physics.brocku.ca/courses/4p7d.&> Nptel.iitm.ac.in

CORE COURSE –XIII [Practical]

Subject Code: 18UPH633 Credits : 4

MAJOR PRACTICAL - III

(Practical Examination at the end of Sixth Semester)

1. Young's modulus - Non uniform Bending - Koenig's method
2. Tan C position- Determination of m and BH
3. Spectrometer - Small angled prism - Normal incidence and emergence- refractive index of the material of a prism
4. Spectrometer - (i - i') curve - refractive index of the material of a solid prism
5. Spectrometer - Cauchy's constants- A and B
6. Spectrometer – Dispersive power of grating
7. Newton's rings - R_1 , R_2 and μ of convex lens
8. Newton's rings – Refractive index of a liquid
9. Field along axis of a circular coil–Deflection magnetometer– Determination of M
10. Field along axis of a circular coil–Deflection magnetometer -Determination of B_H
11. Carey Foster's bridge –Temperature co-efficient of a coil
12. Potentiometer - Calibration of high range voltmeter
13. Potentiometer – Temperature coefficient of resistance of a thermistor coil
14. B.G - Figure of merit (quantity of charge)
15. B.G - Comparison of EMF's
16. B.G - Comparison of capacitances
17. B.G –Absolute capacitance

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RSE –
XIV**

Subject
Code:
18UP
H634

Credits : 4

MAJOR PRACTICAL - IV
(Practical Examination at the end of Sixth Semester)

- 1.IC regulated power supply – study of regulation properties – IC 7805
- 2.Bridge rectifier - Zener regulated power supply - 9V characteristics
- 3.UJT –relaxation oscillator
- 4.Transistor Characteristics – Common Emitter Mode
- 5.Transistor Characteristics – Common Base Mode
- 6.R-C Coupled Single Stage Amplifier - Frequency Response
- 7.Wien's Bridge Oscillator – measurement of frequency
- 8.Hartley Oscillator - measurement of frequency
- 9.FET characteristics – Determination of parameters
- 10.FET Amplifier – Frequency response
11. UJT characteristics – Determination of parameters
- 12.Transistor – Astable multivibrator
- 13.AND, OR, NOT using diodes and transistors
- 14.NAND and NOR as universal gate
- 15.Half Adder – Full adder – (IC 7400)
- 16.Half Subtractor – Full subtractor – (IC 7400)
- 17.Phase shift oscillator using transistor

CORE COURSE –XV [Practical]

Subject Code: 18UPH635 Credits : 4

MAJOR PRACTICAL - V
(Practical Examination at the end of Sixth Semester)

1. Microprocessor – 8085 – 8 bit Addition & 8 bit Subtraction
2. Microprocessor – 8085 – 16 bit Addition & 16 bit Subtraction
3. Microprocessor – 8085 – 8 bit Multiplication & 8 bit Division
4. Microprocessor – 8085 – Sorting of given set of numbers in ascending & descending order
5. Microprocessor – 8085 – Finding the largest & smallest numbers in a given set of numbers
6. Microprocessor – 8085 – Square of a single byte hexa number
7. Op amp IC 741 - Inverting, Non - Inverting amplifier, unity follower.
8. Op amp IC 741 - Summing and difference amplifier
9. Op amp IC 741 – Differentiator, integrator
10. Op amp IC 741 – Wein's Bridge oscillator
11. IC 555 - Timer - Schmitt Trigger
12. IC 555 – Timer – Astable multivibrator
13. IC 555 – Timer - Monostable multivibrator
14. D/A Converter – 4 bit, binary weighted resistor method
15. D/A Converter – R-2R Ladder Method

Books for the Study & Reference :

1. Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency (p) Ltd. Kolkata (2007).
2. Practical Physics and Electronics by C.C. Ouseph, U.J. Rao and Vijayendran, S. Viswanathan (Printers & Publishers) Pvt., Ltd (2007).
3. Practical Physics by C L Arora, S. Chand & Co., New Delhi (2008)

SEMESTER – V

ELECTIVE COURSE - I

Subject Code: Credits : 4

PAPER I - ENERGY PHYSICS

UNIT I: Introduction to Energy Sources

World's reserve of Commercial energy sources and their availability-India's production and reserves-Conventional and non-conventional sources of energy, comparison – Coal- Oil and natural gas – applications - merits and demerits.

UNIT II: Solar Thermal Energy

Solar constant -Solar spectrum-Solar radiations outside earth's atmosphere –at the earth surface- on tilted surfaces -Solar Radiation geometry-Basic Principles of Liquid flat plate collector –Materials for flat plate collector -Construction and working- Solar distillation-Solar disinfection - Solar drying-Solar cooker(box type)-Solar water heating systems – Swimming pool heating.

UNIT III: Photovoltaic Systems

Introduction-Photovoltaic principle-Basic Silicon Solar cell- Power output and conversion efficiency-Limitation to photovoltaic efficiency-Basic photovoltaic system for power generation-Advantages and disadvantages-Types of solar cells-Application of solar photovoltaic systems - PV Powered fan – PV powered area lighting system – A Hybrid System.

UNIT IV: Biomass Energy

Introduction-Biomass classification- Biomass conversion technologies-Bio-gas generation-Factors affecting bio-digestion -Working of biogas plant- floating and fixed dome type plant -advantages and disadvantage of -Bio-gas from plant wastes-Methods for obtaining energy from biomass- Thermal gasification of biomass-Working of downdraft gasifier-Advantages and disadvantages of biological conversion of solar energy.

UNIT V: Wind Energy and Other Energy Sources

Wind Energy Conversion-Classification and description of wind machines, wind energy collectors-Energy storage-- Energy from Oceans and Chemical energy resources-Ocean thermal energy conversion-tidal power, advantages and limitations of tidal power generation- Energy and power from waves- wave energy conversion devices- Fuel cells- and application of fuel cells- batteries- advantages of battery for bulk energy storage- Hydrogen as alternative fuel for motor vehicles.

Books for study

1. Kothari D.P., K.C. Singal and RakeshRanjan, Renewable energy sources and emerging Technologies, Prentice Hall of India, 2008.
- 2.Solar Energy-principles of thermal collection and storage-S.P.SUKHAME-tata-McGraw-Hill publishing company ltd.

Books for References

1. Chetan Singh Solanki, Solar Photovoltaics Fundamentals, Technologies and Applications, 2ndEdition, PHI Learning Private Limited, 2011.
2. Rai G. D, Non conventional Energy sources, 4th Edition, Khanna Publishers, 2010.
3. Jeffrey M. Gordon, Solar Energy: The State of the Art, Earthscan, 2013.
4. Kalogirou S.A., Solar Energy Engineering: Processes and Systems , 2nd Edition, Academic Press, 2013.
5. ZobaaA.F.and Ramesh Bansal, Handbook of Renewable Energy Technology, World Scientific, 2011.

SEMESTER – V

ELECTIVE COURSE

Subject Code: Credits : 4

PAPER II – NANOPHYSICS

UNIT I:Nanomaterials

History of Nanotechnology- Nanostructures- synthesis of oxide nano particles- Synthesis of semiconductor nano particles- Synthesis of metallic nano particles

UNIT II: Quantum Hetero structure

Super lattice- preparation of Quantum nanostructure- Quantum well laser- Quantum cascade laser-Quantum wire- Quantum dot- Application of Quantum dots.

UNIT III: Carbon Nanotubes

Discovery of Nanotubes- Carbon Allotropes- Types of carbon Nanotubes- Graphene sheet to a single walled nanotube- Electronic structure of Carbon Nanotubes- Synthesis of Carbon Nanotube.

UNIT IV

Nanocrystalline soft material- Permanent magnet material- Theoretical background- Super paramagnetism- Coulomb blockade-Quantum cellular Automata.

UNIT V: Application of Nanotechnology

Chemistry and Environment – Energy applications of nanotechnology- Information and Communication- Heavy industry-Consumer goods- Nanomedicine - Medical application of Nanotechnology

Text Book:

1. Text book of Nanoscience and Nanotechnology – B. S. Moorthy, P. Sankar, Baldev Raj, B. B. Rath and James Murdy University Press – IIM
2. Nanophysics, Sr. GeradinJayam, Holy Cross College, Nagercoil (2010)

Reference:

- 1) ‘Nanoscience and Nanotechnology: Fundamentals to Frontiers’
M.S. RamachandraRao, Shubra Singh, Wiley India pvt. Ltd., New Delhi. (2013).
- 2) ‘Nano the Essentials’ - T. Pradeep, Tata Mc.Graw Hill company Ltd (2007)
- 3) ‘*The Chemistry of Nano materials : Synthesis, Properties and Applications*’, Volume 1
C. N. R. Rao, A. Müller, A. K. Cheetham, , Germany (2004).

SEMESTER – V

ELECTIVE COURSE

Subject Code: Credits : 4

PAPER III-SPECTROSCOPY

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 –Polyatomic Molecules – Symmetric Top molecules – Asymmetric Top 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 – IR Spectrum of carbon monoxide - 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- Linear molecules – Raman Spectrum of symmetric top molecules - Vibrational Raman spectra – Rule of mutual exclusion –

Overtone and Combination Vibrations - Rotational Fine Structure – Polarization of light and the Raman Effect - Structure determination from IR and Raman spectroscopy.

Unit IV : Electronic spectroscopy

Born - Oppenheimer approximation – Vibrational coarse structure: Progressions – Frank-Condon principle – Dissociation energy and Dissociation products – Rotational Fine Structure of Electronic Vibration Transitions - Fortrat diagram - Predissociation – Diatomic molecules.

Unit V :Instrumentation

Instrumentation and Techniques in Infrared spectroscopy – Sources – monochromators – Sample cells – Detectors – Single beam Infra red spectrometer – Double beam Infra red spectrometer

Book For Study

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

Book For Reference

- 1.Molecular structure and spectroscopy - G. Aruldas, PHI Learning Pvt. Ltd, India.
- 2.Hand book of Analytical Instruments -R.S. Khandpur, Tata MC Grow Hill Ltd

SEMESTER – V

ELECTIVE COURSE

Subject Code: Credits : 4

PAPER V-COMPUTER PROGRAMMING IN C++

UNIT I: WHAT IS C++

Introduction - tokens - keywords - identifiers and constants - declaration of variables - basic data types - user defined data types-derived data types - symbolic constants - operators in C++ -expressions and their type-hierarchy of arithmetic operators- scope resolution operator – declaring, initializing and modifying variables-special assignment operators - all control structures-structure of a simple C ++ program

UNIT II:ARRAYS AND FUNCTIONS IN C++

Introduction - one dimensional and two dimensional arrays-initialization of arrays-array of strings

Functions-introduction-function with no argument and no return values- function with no argument but return value - function with argument and no return values- function with argument and return values- call by reference-return by reference- function prototyping - inline functions - local, -global and static variables- -function overloading - virtual functions-main function-math library functions.

UNIT III:CLASSES AND OBJECTS

Introduction - specifying a class - defining member functions-C++ program with class - nesting of member functions - private member functions - objects as function arguments - arrays within a class-array of objects-static class members-friend functions-constructors - parameterized constructors-multiple constructors - constructors with default arguments - copy constructor.

UNIT IV: OPERATOR OVERLOADING, INHERITANCE AND POINTERS

Introduction -defining operator overloading - overloading unary operators - binary operators

Inheritance - single inheritance - multiple inheritance - multilevel inheritance - hybrid inheritance - hierarchial inheritance-virtual base class-abstract class

Pointers- definition-declaration- arithmetic operations

UNIT V:MANAGING CONSOLE I/O OPERATIONS

Introduction - C++ stream - C++ stream classes - unformatted I/O Operations -formatted console I/O operations - working with files - classes for file stream operations - opening and closing a file - file pointers and their manipulations.

BOOK FOR STUDY:

1. E. Balagurusamy, Programming in ANSI C, Sixth Edition, McGraw Hill Education(India)Private Limited, New Delhi.

BOOKS FOR REFERENCE:

1. Schaum'sOutlines : Programming with C , Byron S. Gottfried, Tata McGraw Hill Pub. Co Ltd., New Delhi, 5/e, 2007
2. YashvantKanetkar, Programming with C,2nd edition, Tata McGraw Hill, New Delhi,1998.

SEMESTER – VI

ELECTIVE COURSE

Subject Code:

Credits : 4

PAPER V-MATHEMATICAL PHYSICS

UNIT1 : VECTOR CALCULUS

Divergence and curl of a vector point function - Line Integral – Surface Integral – Volume Integral (without problem) – Gauss's Divergence theorem and it's proof - Deduction from Gauss theorem – Green's theorem in the plane - Stoke's theorem in space - simple problems.

UNIT – 2: DIFFERENTIAL EQUATION

First-order differential equations - Separable variables -Exact equations-Integrating factors -Bernoulli's equation- Second-order equations with constant coefficients - Nature of the solution of linear equations - General solutions of the second-order equations - Finding the complementary function - Finding the particular integral - Rules for D operators - The Euler linear equation - Solutions in power series.

UNIT – 3: MATRICES

Introduction – special types of Matrices – Transpose of a Matrix – The Conjugate of a Matrix – Conjugate Transpose of a Matrix – Symmetric and Anti symmetric – Hermitian and skew Hermitian – Orthogonal and Unitary Matrices – Properties – Characteristics equation – Roots and characteristics vector – Diagonalization of matrices – inverse of a matrix - Cayley-Hamilton theorem – Problems

UNIT – 4: LAPLACE TRANSFORMATION

Definition of the Laplace transform - Existence of Laplace transforms - Laplace transforms of some elementary functions - Shifting (or translation) theorems - The first shifting theorem - The second shifting theorem - The unit step function - Laplace transform of a periodic function

UNIT -5: PARTIAL DIFFERENTIAL EQUATIONS

Linear second-order partial differential equations - Solutions of Laplace's equation: separation of variables - Solutions of the wave equation: separation of variables - Solution of Poisson's equation. Green's functions - Laplace transform solutions of boundary-value problems

Books for study

1.Mathematical Methods for Physicists: A concise introduction, - *TAI L. CHOW* -CAMBRIDGE UNIVERSITY PRESS.

Books for Reference

- 1.Mathematical physics- Piyooshkumartyagi , RBSA Publishers
2. Mathematical physics- Satyaprakash-Sultan Chand & Co:
- 3.Mechanics and mathematical physics -R.Murugesan- Sultan Chand & Co:
4. Mathematical physics-Gupta- Sultan Chand & Co:

SEMESTER – VI

ELECTIVE COURSE

Subject Code: **Credits : 4**

PAPER VI-MICROPROCESSOR FUNDAMENTALS

Unit 1 : Architecture

Architecture of 8085 – registers, flags, ALU, address and data bus, demultiplexing address/data bus – control and status signals – control bus, Programmer's model of 8085 –Pin out diagram – Functions of different pins.

Unit 2 : Programming Techniques

Instruction set of 8085 – data transfer, arithmetic, logic, branching and machinecontrol group of instructions – addressing modes – register indirect, direct, immediate andimplied addressing modes.Assembly language & machine language – programming techniques: addition,subtraction, multiplication, division, ascending, descending order, largest and smallest(single byte)

UNIT 3 : Interfacing memory to 8085

Memory interfacing – Interfacing 2Kx8 ROM and RAM, Timing diagram of 8085 (MOVRd, Rs – MVI Rd,data(8)) .

Unit 4 : Interfacing I/O Ports to 8085

Interfacing input port and output port to 8085 – Programmable peripheral interface 8255– flashing LEDs.

Unit 5 : Interrupts

Interrupts in 8085 - hardware and software interrupts – RIM, SIM instructions – priorities – simple polled and interrupt controlled data transfer.

Books of Study

1. Microprocessor Architecture programming and application with 8085 / 8080A. by R.S. Gaonkar, Wiley Eastern Ltd.(1992).
2. Fundamental of microprocessor 8085 by V. Vijayendran, S. Viswanathan Publishers, Chennai(2003).
3. Fundamentals of Microprocessors and microcomputers by B. Ram - Dhanpat RAI publication.

Books for Reference

1. Introduction to microprocessor by Aditya Mathur - Tata Mc.Graw Hill Publishing Company Ltd.(1987).
2. Microprocessor and digital system by Douglas V. Hall - 2nd Edition - McGraw Hill Company(1983).

SEMESTER – VI

ELECTIVE COURSE

Subject Code: Credits : 4

PAPER VII-OPTO ELECTRONICS

Unit I

Introduction – PN junction as a Light Source (LED) – LED materials – Advantages – LCD _ Characteristics and action of LCD – Advantages.

Unit II

Laser- Introduction– characteristics of Laser– Spontaneous and stimulated emission– Einstein coefficients- condition for population inversion– three level scheme– semi conductor.

Unit III

Photo detector- characteristics of photo detectors– PN junction photo detector– PIN photo diode- Avalanche photo diode- Photo transistor.

Unit IV

Introduction – principle of optical fibre – light transmission in a optical fibre – Acceptance angle – Numerical aperture.

Unit V

Fibre index profiles – Step index, graded fibre (transmission of signals) – Advantages of fibre optic communications, optical switching – Logic gates.

Text Book:

1. Semiconductor physics and Optoelectronics – P. K. Palanisamy, SCITECH Publication, Chennai 2002.
2. Optical fibres and Fibre Optic Communication – Sabir Kumar Sarkar IV Revised Edition 2003.

Reference Books:

1. Opto Electronics – Wilson & Hawker, Prentice Hall of India 2004.

SEMESTER – VI

ELECTIVE COURSE

Subject Code:

Credits : 4

PAPER VIII - MEDICAL PHYSICS

UNIT I

Basic Anatomical Terminology- Standard anatomical position, Planes, Familiarity with terms like – Superior, Inferior, Anterior, Posterior, Medial, Lateral, Proximal, Distal. – Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- Energy work and Power of the Body.

UNIT II

Pressure system of the body- Physics of Cardiovascular system- Electricity within the Body – Applications of Electricity and Magnetism in Medicine.Sound in medicine- Physics of the Ear and Hearing- Light in medicine- Physics of eyes and vision.

UNIT III

Transducers- performance of characteristics of transducer- static and dynamic active transducers – (a) magnetic induction type (b) piezoelectric type (c) photovoltaic type (d) thermoelectric type.Passive transducer- (a) resistive type – effect and sensitivity of the bridge (b) capacitive transducer (c) linear variable differential transducer (LVDT).

UNIT IV

X-rays- Production of X-rays- X-ray spectra- continuous spectra and characteristic spectra- Coolidge tube- Electro Cardio Graph (ECG) - Block diagram- ECG Leads- Unipolar and bipolar-ECG recording set up.

UNIT V

Electro Encephalo Graph (EEG) - origin- Block diagram- Electro Myograph (EMG) – Block diagram- EMG recorder- Computer Tomography (CT) principle- Block diagram of CT scanner.

Text Books

1. Medical Physics –John R. Cameron and James G.Skofronick, 1978, John Willy & Sons.
2. Bio medical instrumentation – E D II, Dr M. Arumugam, Anuradha Agencies 1997.

SEMESTER – I

NONMAJOR ELECTIVE

Subject Code:

Credits : 4

FUNDAMENTALS OF PHYSICS –I

Unit 1

S.I. Units – measurements of length, mass, time and other physical quantities – Dimensional formula for area, volume, density and force – Uses of dimension.

Unit II

Matter – Solid, Liquid, Gas and Plasma – Application of Plasma – change of state – specific heat capacity – specific latent heat of ice and steam.

Unit III

Kinds of energy – Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, Atomic and Nuclear energy, (Examples) – Conservation of energy.

Unit IV

Renewable and non – renewable energy – Fossil fuel – coal Oil – Solar – Wind – Biomass – OTEC.

Unit V

Mirror – Laws of reflection – Image formation (Concave and Convex mirror) Lens – Law's of refraction – Image formation (Concave and Convex lens) – Defects of eye and rectification.

Book for Study

1. First Year B. Sc Physics – B.V. Narayan Rao, New Age International (P) Lt, 1998.

Reference Books

1. Mechanics – D.S. Mathur – S.Chand& Co., 2002.
2. Properties of matter – D.S. Mathur – S. Chand & Co., 2002.
3. Properties of matter – Brijlal Subramanian – S. Chand & Co., 2006.

SEMESTER – I

NON MAJOR ELECTIVE

Subject Code: Credits : 4

PAPER-II ENERGY PHYSICS

UNIT I Conventional Energy Sources

World reserve- Commercial energy sources and their availability – Various forms of energy – Renewable and Conventional energy system – comparison – Coal, oil and natural gas – applications – Merits and Demerits.

UNIT II Solar energy

Renewable energy sources – Solar energy – nature and Solar radiation –components – Solar heaters – Crop dryers – Solar cookers – Water desalination (block diagram) -Photovoltaic generation – merits and demerits.

UNIT III Biomass energy fundamentals:

Biomass energy – classification – Photosynthesis – Biomass conversion process

UNIT IV Biomass Utilization

Gobar gas plants – Wood gasification – advantage & disadvantages of biomass as energy source

UNIT V Other forms of energy sources

Geothermal energy – Wind energy – Ocean thermal energy conversion –Energy from waves and tides (basic ideas).

Books for study:

1. D.P. Kothari, K.C. Singal&RakeshRanjan, *Renewable energy sources and emerging Technologies*, Prentice Hall of India Pvt. Ltd., New Delhi (2008).
2. Suhas P Sukhatme, *Solar energy -- Principles of thermal collection and storage*, Tata McGraw-Hill Publishing company, New Delhi, Second edition, 2012.

Books for References:

1. S.A. Abbasi and Nasema Abbasi, *Renewable Energy sources and their environmental impact*, PHI Learning Pvt. Ltd., New Delhi (2008).

SEMESTER – II
NON MAJOR ELECTIVE

Subject Code:

FUNDAMENTALS OF PHYSICS –II

Unit – I

Electric current- voltage and resistance- Ohm's law- Kirchhoff's law- Resistances in series and in parallel.

Unit – II

DC Source – Primary cells – Leclanche and Daniel cell – Secondary cells – Lead Acid Accumulator – DC generator.

Unit – III

Alternating current generation by hydro, thermal and atomic power stations– RMS value – Peak value (Quantitative) – AC generator – no derivation.

Unit – IV

Measurement of Electric power by Wattmeter- simple calculations- Induction coil- Wattless current- Power factor.

Unit – V

Simple electrical circuits – resistor, capacitor and inductor connected to AC source (independently) – Relationship between emf and current in each case. Diode – Bridge Rectifier.

Reference Books

1. Electricity and Magnetism – R. Murugesan – S. Chand & Co 2004.

SEMESTER – II
NON MAJOR ELECTIVE

Subject Code: **Credits : 4**

PAPER-IV LASER PHYSICS

Objective:

To introduce the physical and engineering principles of laser operation and their applications.

UNIT I Fundamentals of LASER

Spontaneous emission – Stimulated emission – Meta stable state –Population inversion – Pumping – Laser Characteristics

UNIT II Production of LASER

Helium – Neon Laser – Ruby Laser – CO₂ Laser – Semiconductor Laser

UNIT III Industrial Applications of LASER

Laser cutting – Welding – Drilling – Hologram – Recording and reconstruction of hologram

UNIT IV Lasers in Medicine

Lasers in Surgery – Lasers in ophthalmology – Lasers in cancer treatment

UNIT V Lasers in Communication

Optic fibre communication – Total internal reflection – Block diagram of fibre optic communication system – Advantages of fibre optic communication.

Books for study:

1. N. Avadhanulu, *An introduction to LASERS*, S. Chand & Company, 2001.

Books for References:

1. William T. Silfvast, *Laser fundamentals*, University Press, Published in South Asia by Foundation books, New Delhi, 1998.

2. K. Thyagarajan and A.K. Ghatak, *LASER Theory and Application*, Mc Millan, India Ltd, 1984.

ALLIED PHYSICS

ALLIED COURSE I

PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS (THEORY)

UNIT I: Properties of Matter

Young's modulus – Rigidity modulus – Bulk modulus – Poisson's ratio (definition alone) – Bending of beams – Expression for bending moment – determination of young's modulus – uniform and non-uniform bending.

Expression for Couple per unit twist – work done in twisting a wire – Torsional oscillations of a body – Rigidity modulus of a wire and M.I. of a disc by torsion pendulum.

UNIT II: Surface tension and Viscosity

Surface tension – molecular theory of surface tension – drop weight method- interfacial surface tension

Viscosity – Viscous force – Co-efficient of viscosity – units and dimensions – Poiseuille's formula for co-efficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities

UNIT III: Conduction, Convection and Radiation

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – Specific heat capacity of a liquid by cooling – thermal conduction – coefficient of thermal conductivity by Lee's disc method.

Convention process – Lapse rate – green house effect – Black body radiation – Planck's radiation law – Rayleigh Jean's law, Wien's displacement law – Stefan's law of radiation. (No derivations).

UNIT IV: Thermodynamics

Zeroth and I Law of thermodynamics – II law of thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam.

UNIT V: Optics

Interference – Interference in thin films - air wedge – determination of thickness of a wire – Newton's rings – determination of radius of curvature of a lens. **Diffraction** – Fresnel

& Fraunhofer diffraction - Fresnel's explanation of rectilinear propagation of light – plane transmission grating – Determination of wavelengths of spectral lines of mercury spectrum using plane transmission grating. **Polarisation** – polarization by reflection - double refraction – Nicol prism as polarizer and analyser.

Text Books:

1. Properties of matter – Brijlal and Subramanyam – Eurasia Publishing co., New Delhi,

III Edition 1983

2. Element of properties of matter – D.S. Mathur – S. Chand & Company Ltd, New Delhi, 10th Edition 1976

3. Heat and Thermodynamics – Brijlal & Subramanyam, S. Chand & Co, 16th Edition 2005
Heat and Thermodynamics – D.S. Mathur, Sultan Chand & Sons, 5th Edition 2014.

4. Optics and Spectroscopy – R. Murugesan, S. Chand and co., New Delhi, 6th Edition 2008.

ALLIED COURSE II

ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS (THEORY)

UNIT I: Current Electricity

Ohm's law – Law of resistance in series and parallel – Specific resistance – capacitors – capacitors in serial and parallel – Kirchoff's laws – Wheatstone's network – condition for balance

Carey-Foster's bridge – measurement of resistance – measurement of specific resistance – determination of temperature coefficient of resistance – Potentiometer – calibration of Voltmeter.

UNIT II: Electromagnetism

Electromagnetic Induction – Faraday's laws – Lenz law – Self Inductance – Mutual Inductance – Coefficient of Coupling

A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – impedance – resonant frequency – sharpness of resonance.

UNIT III: Atomic and Nuclear Physics

Bohr's atom model – radius energy – Atomic excitation – Ionization potential – Frank and Hertz Method – Nucleus – Nuclear properties – Mass defect – Binding energy.

Radio isotopes – Uses of radio isotopes – Nuclear fusion and Nuclear fission – X-rays – Production – properties – Derivation of Bragg's law – uses in industrial and medical fields.

UNIT IV: Analog Electronics

Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply.

Transistor – Working of a transistor – CE Configuration – current gain relationship between α and β – Transistor Characteristics – CE Configuration only

UNIT V: Digital Electronics

Number system – Decimal – Binary – Octal and Hexadecimal system – Double Dabble method – Binary addition, subtraction and multiplication – conversion of one number system to another number system.

Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws and theorems of Boolean's algebra – De Morgan's theorems.

Books for Study and Reference:

1. Electricity and Magnetism – R. Murugesan, S. Chand & co, 2001.
2. Modern Physics – R. Murugesan, S. Chand & co, 1998.
3. Basic Electronics – B.L. Theraja, S. Chand & co, 2003.

ALLIED PHYSICS COURSE [Practical]

Subject Code: Credits : 4

ALLIED PHYSICS PRACTICAL (At the end of the Fourth semester)

1. Young's modulus by non uniform bending - pin and microscope
2. Young's modulus by non uniform bending using Optic lever and scale & telescope
3. Surface tension and interfacial surface tension - drop weight
4. Sonometer – determination of frequency of A.C. main supply
5. Air wedge-thickness of a wire
6. Newton's Rings-radius of curvature of a lens
7. Comparison of co-efficient of viscosities between two liquids
8. Potentiometer – Calibration of low range voltmeter
9. Post office box – Resistance and specific resistance

10. Figure of merit – Spot galvanometer(or) table galvanometer
11. Construction of AND, OR gates using diodes and NOT gate using transistor
12. Transistor characteristics – Common emitter mode
13. Rigidity modulus - Static torsion method
14. Rigidity modulus– Torsion pendulum
15. Determination of wavelength using diode laser source

Books for study and reference

1. Allied practical physics - M.Srinivasan, S.Chand & Co.
2. Allied Practical Physics – M. Arul Thalapati, Comptek Publishers (2003)
3. Practical physics and electronics - C.C.Ouseph, U.J.Rao, V. Vijayendran-S.Viswanathan (Printers & Publishers), Pvt.Ltd.

Soft Skill for the students other than Computer Science

IV Semester

SBE: COMPUTER BASICS AND OFFICE AUTOMATION

COURSE OBJECTIVES

The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. The course is highly practice oriented rather than regular class room teaching.

UNIT - I

Introductory concepts: History - Generation - Classification - Block diagram - Memory unit – CPU.

UNIT - II

Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: UNIX – Windows. Introduction to Programming Languages: C, C++ and its features.

UNIT - III

Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options.

UNIT - IV

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing.

UNIT - V

Power point: Introduction to Power point - Features – Understanding slide types – creating & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects.

TEXT & REFERENCE BOOKS

1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.
2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw-Hill.

Note : All units need an approach through practical exposure.

PERSONALITY ENRICHMENT

SUBJECT CODE:
CREDITS : 2

SOFTSKILL:III

Unit I : Introduction-Definition of Personality-Determinants of Personality biological, psychological and socio-cultural factors.Misconceptions and Classifications-Need for personality development

Unit II: Self-awareness and self-motivation-Definition of self, self concept and self awareness-Self analysis through SWOT and Johari window
Definition of Motivation-Types of Motivation-Techniques and strategies for self motivation-Motivation checklist and Goal setting based on the principle of SMART Self motivation and life

Unit III- Memory and Decision making-Definition and importance of memory- Causes of forgetting-Techniques of improving memory
The decision making process

Unit IV: Study skills-Definition of study skills-Characteristics of study skills
Techniques of passing exams

Unit-V : ASSERTIVENESS-Definition and characteristics-Assertive-submissive-Aggressive differences-Assertiveness skills

References

1. Mile, D.J. 2004. Power of positive thinking.Delhi:Rohan Book Company.
2. Praveshkumar. 2005. All about self-motivation. New Delhi: Goodwill Publishing House
3. Dudley, D.A. 2004. Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.

4. Lorayne, H. 2004. How to develop super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd.
5. Hurlock, E.B. 2006. Personality Development, 28th Reprint. New Delhi: Tata

ENVIRONMENTAL STUDIES

Common for all U.G. Courses

(Effective from the Academic Year 2019 – 2020)

Unit 1 : Scope and importance of Environmental Science : Definition, Multidisciplinary nature of environmental science, scope and importance; global environmental problems.

Unit 2 : Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids.

Unit 3 : Biodiversity and its conservation : Introduction – Definition : Value of biodiversity: consumptive use, productive use. India as a mega-diversity nation, Hot-spots of biodiversity. Brief account on biodiversity conservation.

Unit 4 : Environmental Pollution : Definition – Cause, effects and control measures of :- a) Air pollution, b) Water pollution. Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Unit 5 : Social Issues and the Environment : Water conservation, rain water harvesting. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents. Waste land reclamation.

Text Books:

1. Environmental Studies (UGC syllabus), Jazym Publications, Trichy.
2. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.
3. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
4. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi
5. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India

SEMESTER IV
VALUE BASED EDUCATION
Common for all UG Courses
(Effective from the Academic Year 2019-2020)

SUBJECT CODE:19UDVBE1

CREDITS 2

UNIT- I

Values

Definition and Meaning of Values- Human Values, Social Values, Cultural and Religious Values, Ethical Values, Global Values and Spiritual Values

UNIT-II

The Power of Positive Thinking

‘Building Self-Confidence’-Norman Vincent Peale (From Touchstone: Synergy of Values)

UNIT-III

Leadership: The Challenge of Excellence

Living Excellence –Anthony Robbins (From Touchstone: Synergy of Values)

UNIT-IV

The Personal Value of Truth and Its Importance

The Story of My Experiments with Truth - M.K. Gandhi (Chapter 2)

UNIT V

Human Rights

Human Rights – Universal Declaration of Human Rights – Human Rights violations (From Touchstone: Synergy of Values)

REFERENCE BOOKS

- 1) *Touchstone : Synergy of Values* (Madras University Publication - 2003)
- 2) Swami Vivekananda- *Youth and Modern India*, Ramakrishna Mission, Chennai.
- 3) M.K.Gandhi- *The Story of My Experiments with Truth*, Maple Classic
- 4) Norman Vincent Peale-*The Power of Positive Thinking*
- 5) [Martin Meadows](#)- *How to Build Self-Discipline: Resist Temptations and Reach Your Long-Term Goals*
- 6) M.G.Chitakra- *Education and Human Values*, A.P.H Publishing Corporation, New Delhi,
- 7) Anthony Jay Robbins - *Unlimited Power: The New Science of Personal Achievement*, Free Press New York, 1986 (Pages 408 – 410)
- 8) Ed. Dr. N.Venkataiah. *Value Education*. APH Publishing Corporation, New Delhi,2007.(Pages 1- 8)