Davangere University
Shivagangotri, Davangere-577 002

GRADUATE PROGRAMME - Semester Scheme

Subject: Physics

Syllabus: 2016-2017

Course Code, Course Titles, Teaching Hours per Week and Allocation of Marks:

Course No.	Course Code	Semester	Title of the Course	Hours Per Week	Credits	I.A. Marks	Theory/ Practical Marks	Total Marks
1	Phy.Core:I.1	I	Mechanics and Properties of Matter	4	4	20	80	100
	Phy.Pra:I		Physics Practicals-I	3	1.5	10	40	50
2	Phy.Core:II.2	II	Thermal Physics and Waves	4	4	20	80	100
	Phy.Pra:II		Physics Practicals -II	3	1.5	10	40	50
3	Phy.Core:III.3	III	Geometrical Optics and Electricity	4	4	20	80	100
	Phy.Pra:III		Physics Practicals -III	3	1.5	10	40	50
4	Phy.Core:IV.4	IV	Wave Optics and Electromagnetism	4	4	20	80	100
	Phy.Pra:IV		Physics Practicals –IV	3	1.5	10	40	50
5	Phy.Core:V.5	V	Atomic Physics and Lasers	3	3	20	80	100
	Phy.Pra:V		Physics Practicals -V	3	1.5	10	40	50
6	Phy.Core:V.6		Molecular Physics, Nuclear Physics and Statistical Mechanics	3	3	20	80	100
	Phy.Pra:VI		Physics Practicals –VI	3	1.5	10	40	50
7	Phy.Core:VI.7	VI	Electronics, Solid State Physics and New Materials	3	3	20	80	100
	Phy.Pra:VII		Physics Practicals-VII	3	1.5	10	40	50
8	Phy.Core:VI.8		Relativity, Astrophysics, Quantum Mechanics and Space Physics	3	3	20	80	100
	Phy.Pra: VIII		Physics Practicals- VIII	3	1.5	10	40	50
Total Number of Hours and Marks (Semester I to VI)				28T+24P	40 (28T+12P)	240	320-P 640-T	1200

Note:

Total Number of Marks for Theory Examination for Each Course (Paper) in each Semester	100 Marks
• Of which, Internal Assessment : 20 Marks	
• End Semester Examination : 80 Marks	
Total Number of Marks for Practical Examination for Each Course	50 Marks
Out of 50 Marks:	
• For Practical : 40 Marks	
• IA (Record + VIVA) : 10 Marks	

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PRINCIPAL
D.R.M. Science College
DAVANGERE-577 004

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GRADUATE PROGRAMME

Bachelor's of Science (B.Sc.)

Semester Scheme (From 2016-17)

Syllabus, Scheme of Instruction & Examination

Semester	Paper number	Title of the Paper	No.of Teaching Hours per Week	Examination Duration	Maximum Marks		Total Maximum Marks
					Final Exam	IA	
I	PHY 101 PHY 102		4 hours 3 hours	3 hours 3 hours	80 40	20 10	100 50
II	PHY 201 PHY 202		4 hours 3 hours	3 hours 3 hours	80 40	20 10	100 50
III	PHY 301 PHY 302		4 hours 3 hours	3 hours 3 hours	80 40	20 10	100 50
IV	PHY 401 PHY 402		4 hours 3 hours	3 hours 3 hours	80 40	20 10	100 50
V							
VI							
						Grand Total=	1200

Note-I:

- The paper number is a three digit number with '0' in the middle
- The digit to the left of '0' indicates the semester number
- Odd number to the right of '0' indicates a theory paper
- Even number to right of '0' indicates a practical paper

Note-II:

Theory Question paper pattern: It consists of three parts A,B and C

Part	Marks	Number of questions to be set	Number of questions to be answered	TOTAL
A	2	8	6	12
B	8	8	6	48
C (Problems)	4	7	5	20
			TOTAL	80

Note-III:

The marks distribution for the final practical examination is as follows:

1. Writing formula, Explanation, Figure/circuit diagram — 10 Marks
2. Setting up of the experiment & entering the observations in the tabular column. — 20 Marks
3. Calculation / Graph, Results with Units — 10 Marks
   Total for the practical examination — 40 Marks
4. IA (Record + Viva) — 10 Marks

Total 50 Marks

A minimum of EIGHT (8) experiments must be performed in each practical paper.

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GRADUATE PROGRAMME

Bachelor of Science (B.Sc.)

Semester Scheme Syllabus (From 2016-17)

Subject: PHYSICS

SEMESTER – I

Paper 1: Mechanics and Properties of Matter

52 hours *(4 Hours of Teaching per Week)*

MODULE -1

Dynamics of System of Particles: Newton's Laws – Statement &brief explanation.Centre of mass, motion of centre of mass – expression for coordinates of position, velocity &acceleration of centre of mass (for two body system and extended to n-body system). Linear momentum of a system of particles - conservation of linear momentum.Newton's II Law extended to a system of particles $[M\ddot{R} = F^{ext}]$, Angular Momentum - conservation of angular momentum, relation between angular momentum and angular momentum about the centre of mass ($L=L_{cm}+R\times P$).

System of variable mass - motion of single stage rocket - expression for instantaneous and final velocities (derivation- neglecting the effect of gravity).Problems.

Work & Energy: Work doneby a variable force, conservative and non-conservative forces – examples.Kinetic energy, work-energy theorem (statement and proof),Potential energy, Law ofconservation of energy (statement withexamples),conservation of energy in case of SHM and spiral spring (Proof), expression for period of vertical oscillations of a loaded spiral spring.Problems.

Collisions: Elastic and inelastic collisions - examples. Elastic head-oncollision - expression for final velocities of colliding bodies, Oblique collision of identical masses in a plane (derivation).Problems.

(13 hours)

MODULE -2

Friction: static and dynamical friction, motion along an inclined plane – acceleration of a body with and without friction (derivation). Problems.

Motion in a Plane: expression for radial and transverse components of velocity and acceleration - application to circular motion - centripetal and centrifugal forces. Problems.

Frames of Reference: inertial and non-inertial frames, Galilean principle of relativity (Statement & explanation). Galilean transformation Equations, Expression for fictitious force for an non-inertial frames Ex: Plumb line in an accelerated frame (derivation).Problems.

Gravitation: Newton's Law of Gravitation, Kepler's laws of planetary motion (derivation). Principle of launching of satellites, expressions for orbital velocity, period &altitude of satellites (derivation).Escape velocity (derivation), Geostationarysatellites (brief).Remote Sensing Satellites (brief explanation & applications)-Problems.

(13 hours)

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MODULE -3

Rotation of a Rigid Body: Review of rotational motion of a rigid body, moment of inertia of a rigid body, kinetic energy of rotating body, Relation between angular momentum & moment of inertia (L=Iω). Conservation of angular momentum $\left[\tau = \frac{dL}{dt} = 0\right]$ and illustrations.

Theorems of perpendicular & parallel axes with proof, derivation of moment of inertia in case of annular ring, disc, solid sphere and rectangular bar. Kinetic energy of body rolling down a smooth inclined plane (derivation).Theory of fly wheel. Problems.

Viscosity : Review of stream line flow and Turbulent flow, Reynolds Number, coefficient of viscosity, Poiseulle's formula (derivation), Terminal velocity, Stoke's law with derivation by dimensional analysis, Viscosity of gases (qualitative).Problems.

(13 hours)

MODULE -4

Elasticity: Stress and Strain, Elastic Limit - Hooke's Law. Elastic constants and relation between them (q, n & k).Poisson's ratio – limiting values.Elastic potential energy (derivation in case of elongated wire – U = ½ x stress x strain). Bending of beams- expression for bending moment (derivation), Theory of cantilever, couple per unit twist of a cylinder (derivation), torsional pendulum (theory). Problems.

Surface Tension: adhesive and cohesive forces – angle of contact. Surface energy- relation between surface tension & surface energy (derivation).Excess pressure across curved liquid surface (derivation). Capillary ascent with theory. Factors affecting surface tension (qualitative). Problems.

(13 hours)

REFERENCES –

1. D S Mathur & P S Hemne, ***Mechanics***, S Chand and Co., New Delhi.
2. C L Arora& P S Hemne, ***Physics for Degree Students(First Year),***S Chand and Co., New Delhi.
3. B Basavaraj & P Sadashiva, ***B. Sc. Physics (Vol. 1)***,Omkar Publications, Bangalore
4. Sundararajan N, George Thomas & Syed Azeez, **College Physics**, United Publishers, Mangalore.
5. B S Agarwal, ***Mechanics & Relativity,*** Kedarnath Ramnath, Meerut.
6. D S Mathur, ***Properties of Matter,*** S Chand and Co., New Delhi.
7. R Murugesan, ***Properties of Matter,*** S Chand and Co., New Delhi.
8. Brijlal & Subramanyam, ***Properties of Matter,*** S Chand and Co., New Delhi.
9. A B Gupta, ***Classical Mechanics & Properties of Matter***, Book & Allied Publishers, Kolkata.
10. Verma H C, ***Concept of Physics (Vol. 1)***, Bharathi Bhavan Publishers, Kanpur.
11. Satyaprakash & Agarwal, ***Elements of Mechanics***, Pragathi Prakashan, Meerut
12. Sen Gupta & Chattarjee, ***A treatise on General Properties of Matter***, New Central Book Agency, Kolkata.
13. F W Sears, M W Zemansky & H D Young, ***University Physics***, Narosa Publications, New Delhi.
14. D. Kleppnar and R J Kolenkow, ***Introduction to Mechanics,*** Tata McGraw-Hill, New Delhi
15. Charles Kittel, etal., ***Mechanics (Berkeley Physics Course, Vol. 1),*** Tata McGraw-Hill, New Delhi
16. David Halliday, Robert Resnick, and Jearl Walker, ***Fundamentals of Physics,*** **Sixth Edition**, John Wiley & Sons, Inc.

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I SEMESTER **PHYSICS PRACTICALS-I** *(3hours of Teaching per week)*

List of Experiments :

1. Fly wheel – Determination of mass and Moment of Inertia.
2. Single Cantilever - Determination of Young's modulus.
3. Uniform Bending - Determination of Young's modulus.
4. q- by Stretching
5. Verification of perpendicular axis theorem
6. Torsional pendulum – to determine C and Rigidity modulus
7. Poiseulle's Method – Determination of coefficient of viscosity.
8. Static Torsion - Determination of rigidity modulus.
9. Verification of Newton's law of cooling.
10. Searle's double bar – Determination of elastic constants.
11. Bar pendulum – Determination of g from h-T and $h^2 - hT^2$ graphs.
12. q- by Koenig's Method.
13. Verification of law of conservation of energy.

NOTE :
1) **Minimum of EIGHT experiments are to be performed**
2) **Any Relevant experiment can also be performed**

REFERENCES –

1. Arora C.L., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
2. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
3. Khandelwal D.P., **A Laboratory Manual of Physics for Undergraduate Classes**. Vani Publications.
4. Saraf B., Etc., **Physics through Experiments,** Vikas Publications.
5. Harnaam Singh., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
6. D C Tayal, University Practical Physics, Himalaya Publishing House.
7. Gupta & Kumar, ***Practical Physics***, Pragati prakashan, Meerut
8. Worsnop and Flint, **Advanced Practical Physics for Students,** Methuen and Company, London.
9. N N Ghosh, **B.Sc., Practical Physics.**

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DAVANGERE UNIVERSITY

GRADUATE PROGRAMME

Bachelor of Science (B.Sc.)

Semester Scheme Syllabus (From 2016-17)

Subject: PHYSICS

SEMESTER – II

Paper 2: Thermal Physics and Waves

52 hours *(4 Hours of Teaching per Week)*

Module – 1

Thermodynamics : Zeroth Law, First Law and Internal energy, Isothermal & adiabatic changes – indicator diagram. Derivation of PV^{γ}=constant. Applications of first law for work done during (i) Cyclic process (ii) adiabatic process (iii) isothermal process (iv) isobaric process (v) isochoric process, Problems.

Carnot's engine – Working – its efficiency (Derivation). Carnot's theorem, Clasius – Clapeyron equation (derivation) – application to melting point and boiling point of a substance, Problems.

Entropy: Second law of Thermodynamics, Entropy Concept – Physical analogies. Change of entropy during reversible and irreversible process with examples. Change of entropy in Carnot's cycle (T-S diagram). Third law of Thermodynamics (Statement), Problems.

13 hours

Module-2

Kinetic Theory of Gases: Maxwell's law of velocity distribution (No derivation) – Calculation of rms velocity & most probable velocity – Derivation of expression for mean free path. Degrees of freedom. Gas laws. Arrival at Van der waal's equation – critical constants (Derivation), Problems.

Thermal Conductivity : Thermal conductivity, Thermal conductivity of good conductor by Searle's method, Thermal conductivity of good conductor by Lee's and Charlton's method, Wiedeman-Franz law, Problems.

13 hours

Module – 3

Black body Radiation: Black body, properties of Black body Radiation , Energy distribution in black body spectrum. Wein's law, Rayleigh-Jean's Law & Stefan's law of radiation. Derivation of Planck's law of radiation (from concept of oscillators) – Deduction of Wein's displacement law, Rayleigh-Jean's Law & Stefan's law from Planck's law. Solar constant – estimation of surface temperature of sun, Problems.

Low temperature Physics: Joule-Thomson effect, Porous plug experiment with theory (for real gases) – derivation of expression for temperature of inversion. Relation between Boyle temperature, inversion temperature and critical temperature of a gas. Liquefaction of Oxygen by cascade process, regenerative cooling. Principle and Working of Adiabatic demagnetization, Problems.

13 hours

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Module-4

Oscillations: Setting up of differential equation describing SHM. Composition of two rectangular SHM's having same period (Lissajou's figures).

Free, forced & damped vibrations, resonance with examples. Analytical treatment of damped & forced vibration. Condition for amplitude of resonance, phase of forced vibration. Theory of Helmholtz resonator, Problems.

Sound : Longitudinal vibrations in a rod - expression for velocity of sound (derivation). Theory of beats, Problems.

Acoustics : Reverberation time, absorption coefficient. Requisites of good acoustics (Qualitative). Derivation of Sabine's formula.

13 hours

REFERENCES –

1. Brijlal & Subramanian, **Heat, Thermodynamics & Statistical Mechanics** S Chand and Co., New Delhi.
2. D S Mathur, **Heat & Thermodynamics,** Sultan Chand and Co., New Delhi.
3. B Basavaraj & P Sadashiva, ***B. Sc. Physics (Vol. 2)***,Omkar Publications, Bangalore
4. Sundararajan N, George Thomas & Syed Azeez, **College Physics**, United Publishers, Mangalore.
5. Basavaraju G and Dipen K Ghosh, **Mechanics and Thermodynamics,** Tata McGraw-Hill, New Delhi.
6. A B Gupta, ***Thermal Physics***, Book & Allied Publishers, Kolkata.
7. C L Arora & P S Hemne, ***Physics for Degree Students (First Year)***,S Chand and Co., New Delhi.
8. F W Sears, M W Zemansky & H D Young, ***University Physics***, Narosa Publications, New Delhi.
9. M W Zemansky & R H Dittaman, Heat & Thermodynamics, McGraw Hill Book company.
10. S C Garg, R M Bansal & C K Ghosh, Thermal Physics, TMH Publishing Company, New Delhi
11. Verma H C, ***Concept of Physics (Vol. 1)***, Bharathi Bhavan Publishers, Kanpur.
12. David Halliday, Robert Resnick, and Jearl Walker, ***Fundamentals of Physics,*** **Sixth Edition**, John Wiley & Sons, Inc.
13. Reif F., **Fundamentals of Statistical and Thermal Physics**, Levant Books (2011)
14. Sharma & Sarkar, ***Thermodynamics & Statistical Physics***, Himalaya Publishing House.
15. F W Sears & G L Salinger, ***Thermodynamics, Kinetic theory & Statistical Thermodynamics,*** Narosa Publishing House.
16. D R Khanna & R S Bedi, ***A Textbook of Sound,*** Atma Ram & Sons, 1971
17. Brijlal & Subramanian, ***A Textbook of Sound***, Vikas Publications.
18. BN Kuchela, **Physics of Waves,**

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II SEMESTER PHYSICS PRACTICALS-II (3hours of Teaching per week)

List of Experiments :

1. Surface Tension & Interfacial Tension – Drop weight method.
2. Stoke's Method - Determination of coefficient of viscosity.
3. Spiral Spring – Determination of g and K by static and dynamic methods.
4. Thermal conductivity of a bad conductor by Lee's and Charlton's method.
5. Verification of Stefan's Fourth Power Law.
6. Angle of contact of mercury – Quincke's method.
7. Determination of Solar Constant.
8. Specific heat of water using Thermistor.
9. Frequency of ac using sonometer.
10. Mode constant using Melde's Arrangement.
11. Helmholtz Resonator.
12. q- by Cantilever – Oscillations Method.
13. Surface Tension of Water – Capillary rise method.

NOTE :
1) Minimum of EIGHT experiments are to be performed
2) Any Relevant experiment can also be performed

REFERENCES –

1. Arora C.L., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
2. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
3. Khandelwal D.P., **A Laboratory Manual of Physics for Undergraduate Classes.** Vani Publications.
4. Saraf B., Etc., **Physics through Experiments,** Vikas Publications.
5. Harnaam Singh., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
6. D C Tayal, University Practical Physics, Himalaya Publishing House.
7. Gupta & Kumar, ***Practical Physics,*** Pragati prakashan, Meerut
8. Worsnop and Flint, **Advanced Practical Physics for Students,** Methuen and Company, London.
9. N N Ghosh, **B.Sc., Practical Physics.**

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GRADUATE PROGRAMME
Bachelor of Science (B.Sc.)
Semester Scheme Syllabus (From 2016-17)
Subject: PHYSICS
SEMESTER – III
Paper 3: Geometrical Optics and Electricity

52 hours *(4 Hours of Teaching per Week)*

Module 1

Geometrical Optics: Mention of basic nature & general properties of light, brief explanation of Snell's law, total internal reflection, critical angle, Problems.

Lens aberration: Types of aberration - spherical and Chromatic aberrations, methods of minimizing spherical aberrations (qualitative), longitudinal and lateral chromatic aberration (derivation), achromatisation of lenses a) in contact b) separated by a distance, Problems.

Eye pieces: Huygen's and Ramdson's eye-piece- construction and working –comparison.

Thermoelectricity: Seebak effect, thermoelectric series, neutral temperature, laws of thermo-electricity, Peltier effect, Demonstration of Peltier effect, Peltier co-efficient, Problems.

13 hour

Module 2

Scalar and vector fields: scalar and vector point function, concept of scalar and vector fields, spatial derivatives, variation with respect to space co-ordinates- del and Laplacian operators - Cartesian expression

Gradient of scalar, and its significance, divergence and curl of a vector and their significance. Mention of Vector Identities, Proof of curl grad $\varphi = 0$ and div curl $A = 0$. Gauss divergence theorem and Stokes theorem (statement and explanation), Problems.

Electric filed and potential: Review of concept of charge. (Qualitative) Coulomb's inverse square law, concept of potential in a conservative field and potential difference. $E = -$ grad V (proof), Gauss law in electrostatics, field near the surface of a charged conductor (derivation), Coulomb's law from Gauss law. Mention of Poisson's and Laplace's equation and uniqueness theorem. Energy density in a electrostatic field(derivation). Electrostatic Pressure on the surface of a charged conductor (derivation), Problems.

13 hour

Module 3

Network Theorems: Review of ohm's law and Kirchhoff's laws, Thevenin's and Norton's theorem (AC and DC statement and illustration), statement and explanation of superposition theorem, maximum power transform theorem (proof), Problems.

Concepts of inductance and capacitance, Parallel plate capacitor- energy stored in capacitor (derivation), Energy stored in a inductor (derivation), . loss of energy due to sharing of charges between two conductors (theory), Problems.

Transient Currents: Review of cell, emf. Growth and decay of current in LR circuit, charging and discharging of capacitor (RC-circuit), discussion of LCR series circuit (qualitative). Ballistic

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nometer (theory) - damping correction, application of BG to find high resistance by leaka
thod, Problems. 13 hour

Module 4

AC circuits –Review of AC (production of AC by wind, hydro thermal, nuclear etc), average value of AC, rms value and their relation, mention response of L, C and R to AC. LCR series circuit – expression for current and impedence using J operator. Series resonant circuit, Parallel resonance circuit. Comparison of series and parallel circuits. Comparison of AC and DC, Discussion of resonance, Q-factor Bandwidth (significance), Power in LCR series circuit (derivation). De-sauty's bridge theory using J operator. CR-Tube construction and working, block diagram of CRO, uses of CRO to measurement of AC, DC and frequencies, Problems.

Filters : High pass and Low pass filters (RC filters), derivation of cut-off frequency, significance, Problems.

13 hour

REFERENCES:

1. Brijlal, Subramanyam & M N Avadhanulu, *A Text book of Optics*, S Chand and Co., New Delhi.
2. Satyaprakash, *Optics*, Ratan PrakashanMandir, Meerut.
3. S L Kakani & M C Bhandari, *Optics*, Sultan Chand & Sons, New Delhi.
4. A B Gupta, *Modern Optics*, Books and Allied Publishers, Kolkata.
5. Ajoy Ghatak, *Optics*, Tata McGraw Hill, New Delhi.
6. C L Arora & P S Hemne, *Physics for Degree Students (Second Year)*, S Chand and Co., New Delhi.
7. N Sundaresan, George Thomas & Syed Azez, *College Physics (Vol. II)*, United Publishers.
8. D F Khandelwal, *Optics and Atomic Physics*, Himalaya Publishing House.
9. B Basavaraj & P Sadashiva, *B. Sc. Physics (Vol. 3)*, Omkar Publications, Bangalore
10. K Tewari, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
11. Mahajan &Rangawala, *Electricity & Magnetism*, Tata McGraw Hill, New Delhi.
12. R Murugesan, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
13. D C Tayal, *Electricity & Magnetism*, Himalaya Publishers, Mumbai.
14. D Chattopadhyay & P C Rakshit, *Electricity & Magnetism*,, New Central Book Agency (P) Limited, Kolkata.
15. Verma H C, *Concept of Physics (Vol. 2)*, Bharathi Bhavan Publishers, Kanpur.
16. David Halliday, Robert Resnick, and Jearl Walker, *Fundamentals of Physics*, Sixth Edition, John Wiley & Sons, Inc.
17. F W Sears, M W Zemansky & H D Young, *University Physics*, Narosa Publications, New Delhi.

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PHYSICS PRACTICALS-III

(3hours of Teaching per week)

...t of Experiments :

1. Charging & discharging of a capacitor – Determination of energy stored.
2. Helmholtz Tangent Galvanometer – Determination of K & B_H.
3. Magnetic field along the axis of a circular coil – Determination of B_H.
4. Low & high pass filters
5. CRO – Measurement of AC(V), DC(V) & frequency
6. Cauchy's Constants
7. Maximum power transfer & Thevenin's theorem
8. Impedance of series RC Circuit and Frequency of AC
9. Interference at an air wedge
10. Diffraction grating – Minimum deviation
11. Thermo emf using BG
12. Biprism

NOTE : 1) Minimum of EIGHT experiments are to be performed
2) Any Relevant experiment can also be performed

REFERENCES –

1. Arora C.L., B.Sc., Practical Physics, S. Chand and Company., New Delhi.
2. Chattopadhyaya D., Rakshit P.C & B. Saha, An Advanced Course in Practical Physics, New Central Book Agency (P) Limited.Kolkata.
3. Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
4. Saraf B., Etc., Physics through Experiments, Vikas Publications.
5. Harnaam Singh., B.Sc., Practical Physics, S. Chand and Company., New Delhi.
6. D.C Tayal, University Practical Physics, Himalaya Publishing House.
7. Gupta & Kumar, *Practical Physics*, Pragati prakashan, Meerut
8. Worsnop and Flint, Advanced Practical Physics for Students, Methuen and Company, London.
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GRADUATE PROGRAMME

Bachelor of Science (B.Sc.)

Semester Scheme Syllabus (From 2016-17)

Subject: PHYSICS

SEMESTER – IV

Paper 4: Wave Optics and Electromagnetism

52 hours *(4 Hours of Teaching per Week)*

Module I

Wave Theory Of Light : Wave front – different types - Huygen's principle, laws of Reflection and refraction(derivation). Derivation of lens makers formula, Problems.

Interference: Review of superposition principle, coherent sources, conditions for sustained interference, division of wave front-Biprism-determination of wavelength.
Division of amplitude, interference in thin films- condition for maxima and minima in case of reflected light, air wedge, determination of thickness of wire, Newton's rings in air and liquid (theory). Michelson's interferometer- construction and working, Determination of λ , $d\lambda$ and thickness of thin glass plate, Problems.

13hours

Module 2

Diffraction: Review of diffraction, half period zones - rectilinear propagation of light, zone plate (construction, working and theory) comparison of zone plate and convex lens, Fresnel's diffraction at a straight edge, intensity distribution curve. Fraunhoffer diffraction at single slit, diffraction grating-normal incidence and oblique incidence (theory) . Dispersive power and resolving power of grating. Comparison of prism spectra and grating spectra, Problems.

13hours

Module 3

Polarization: Review of fundamentals of polarization, Double refraction, uniaxial and biaxial crystals. +ve and –ve crystals, optic axis. Huygen's wave theory of double refraction, O-ray and E-ray. Huygens's construction of O and E wave front, retarding plates, thickness of QWP(theory), mention expression for thickness of HWP .Theory of plane, elliptically and circularly polarized light. Production and analysis of plane, elliptical and circularly polarized light, Problems.
Optical activity –specific rotation- Fresnel's theory of optical rotation, Kerr effect and faraday effect.

13hours

Module 4

Electromagnetism :
Magnetic field of a moving point charge. Biot-Savart's law, application of Biot-Savart's law to magnetic field along the axis of a circular coil. Helmholtz galvanometer (HTG) theory. Ampere's circuital law, comparison of gauss law and ampere's law. Application of ampere's law to
A) a straight conductor B) long solenoid. , Problems.

Maxwell's Equations: Displacement current, Equation of continuity, derivation of Maxwell's equation. Physical significance of Maxwell's equation, Maxwell equation for free space (mention). Electromagnetic wave equation in free space (derivation) , transverse nature of electromagnetic waves, electromagnetic waves in conducting medium (mention), Poynting's theorem (No derivation) and its significance, Problems.

13hours

RENCES:-

1. Brijlal, Subramanyam & M N Avadhanulu, *A Text book of Optics*, S Chand and Co., New Delhi.
2. Satyaprakash, *Optics*, Ratan PrakashanMandir, Meerut.
3. S L Kakani & M C Bhandari, *Optics*, Sultan Chand & Sons, New Delhi.
4. A B Gupta, *Modern Optics*, Books and Allied Publishers, Kolkata.
5. Ajoy Ghatak, *Optics*, Tata McGraw Hill, New Delhi.
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9. B Basavaraj & P Sadashiva, *B. Sc. Physics (Vol. 3)*, Omkar Publications, Bangalore
10. K KTewari, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
11. Mahajan &Rangawala, *Electricity & Magnetism*, Tata McGraw Hill, New Delhi.
12. R Murugesan, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
13. D C Tayal, *Electricity & Magnetism*, Himalaya Publishers, Mumbai.
14. D Chattopadhyay & PC Rakshit, *Electricity & Magnetism*, New Central Book Agency (P) Limited, Kolkata.
15. Verma H C, *Concept of Physics (Vol. 2)*, Bharathi Bhavan Publishers, Kanpur.
16. David Halliday, Robert Resnick, and Jearl Walker, *Fundamentals of Physics*, Sixth Edition, John Wiley & Sons, Inc.
17. F W Sears, M W Zemansky & H D Young, *University Physics*, Narosa Publications, New Delhi.

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RENCES:-

1. Brijlal, Subramanyam & M N Avadhanulu, *A Text book of Optics*, S Chand and Co., New Delhi.
2. Satyaprakash, *Optics*, Ratan PrakashanMandir, Meerut.
3. S L Kakani & M C Bhandari, *Optics*, Sultan Chand & Sons, New Delhi.
4. A B Gupta, *Modern Optics*, Books and Allied Publishers, Kolkata.
5. Ajoy Ghatak, *Optics*, Tata McGraw Hill, New Delhi.
6. C L Arora & P S Hemne, *Physics for Degree Students (Second Year)*, S Chand and Co., New Delhi.
7. N Sundararajan, George Thomas & Syed Azez, *College Physics (Vol. II)*, United Publishers.
8. D P Khandelwal, *Optics and Atomic Physics*, Himalaya Publishing House.
9. B Basavaraj & P Sadashiva, *B. Sc. Physics (Vol. 3)*, Omkar Publications, Bangalore
10. K KTewari, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
11. Mahajan &Rangawala, *Electricity & Magnetism*, Tata McGraw Hill, New Delhi.
12. R Murugesan, *Electricity & Magnetism*, S. Chand & Co., New Delhi.
13. D C Tayal, *Electricity & Magnetism*, Himalaya Publishers, Mumbai.
14. D Chattopadhyay & PC Rakshit, *Electricity & Magnetism*, New Central Book Agency (P) Limited, Kolkata.
15. Verma H C, *Concept of Physics (Vol. 2)*, Bharathi Bhavan Publishers, Kanpur.
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PHYSICS PRACTICALS-IV

(3hours of Teaching per week)

Experiments :

1) Verification of Brewster's law
2) Verification of laws of series and parallel combination of capacitors BG
3) RP of Telescope
4) Diffraction at a straight wire
5) Newton's rings
6) RI of O & E rays – Quartz or Calcite prism
7) LCR – series & parallel resonance circuits
8) Dispersive power of prism
9) Polarimeter
10) Self inductance – Anderson's bridge
11) Diffraction grating – Normal incidence
12) To study variation of potential with frequency across L&C of LCR series circuit Resonant frequency

NOTE : 1) Minimum of EIGHT experiments are to be performed
2) Any Relevant experiment can also be performed

REFERENCES

1. Arora C.L., B.Sc., Practical Physics, S. Chand and Company., New Delhi.
2. Chattopadhyaya D., Rakshit P.C & B. Saha, An Advanced Course in Practical Physics, New Central Book Agency (P) Limited.Kolkata.
3. Khandelwal S., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
4. Saraf B., Et al., Physics through Experiments, Vikas Publications.
5. Harnaam Singh., B.Sc., Practical Physics, S. Chand and Company., New Delhi.
6. D C Tayal, University Practical Physics, Himalaya Publishing House.
7. Gupta & Kumar, *Practical Physics*, Pragati prakashan, Meerut
8. Worsnop and Flint, Advanced Practical Physics for Students, Methuen and Company, London.
9. N N Ghosh, B.Sc., Practical Physics.

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GRADUATE PROGRAMME
Bachelor of Science (B.Sc.)

CBCS Scheme Syllabus (From 2016-17)

Subject: PHYSICS

SEMESTER – V

Paper 5: Atomic Physics and Lasers

(3Hours of Teaching per Week)

Module:1

Atomic Structure

Electron:charge of electron by Millikan's oil drop method (Theory), Specific charge of electron by J.J. Thomson's method(Theory).

3 hours

Vector Atom Model:

Effect of finite nuclear mass on atomic spectra, A qualitative account of Sommerfeld relativistic atom model. Excitation and Ionization potentials - Franck-Hertz experiment. Vector model of atom. Electron spin. Space quantization. Magnetic moment of an electron due to its orbital motion.Stern-Gerlach experiment. Spin-orbit interaction and the fine structure of spectral lines. Quantum number and selection rules. Pauli's exclusion principle,Maximum number of Electrons in a Shell (Derivation), Electronic configuration of atoms. Brief mention of LS and JJ coupling in multi-electron atoms.

10 hours

Module:2

Optical Spectra : Spectral terms, spectral notations selection rules, intensity rules fine structure of spectral lines, Sodium D-lines. Zeeman effect-experimental observations, Normal Zeeman effectfrom quantum theory and anomalous Zeeman effects from quantum theory(Qualitative), Expression for Zeeman shift, Paschen Back effect and stark effect (qualitative)

9 hours

X-raySpectra: Continuous x-rays, production (principle)-Daune-Hunt rule. Characteristics x-rays -Moseley's law –Derivation from Bohr's Theory, X-ray energy level diagram. Theory of Compton scattering.

4 hours

Module:3

LASER: Introduction,Characteristics ofLaser (Directionality, Line width, intensity, spatial and temporal coherence),Spontaneous and Stimulated Emission, Einstein's A and B co-efficient (Derivation), Conditions for laser action – (population inversion, active medium, metastable state,

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pumping), different methods of pumping (brief) Ruby Laser. He-Ne laser energy level diag
Glass Laser (Nd-YAG Laser), CO_2 Laser and Semiconductor Laser construction and working.
Laser application in Research,Industries, Medicine, Communication,Defence and Entertainment(Brief).
Holography- principle of recording and reproduction.

13 hours

REFERENCES:

1. Arthur Beiser, ***Concepts of Modern Physics (Sixth Edition)***, Tata McGraw Hill (2003)
2. Kenneth S Krane, ***Modern Physics (Third Edition)***, John Wiley & Sons (2012)
3. Sundararajan N, George Thomas & Syed Azeez, ***College Physics***, United Publishers (2006).
4. B Basavaraj and P Sadashiva, ***B Sc Physics***, Omkar Publications (2016)
5. S L Gupta and Sanjeev Gupta, ***Unified Physics (Volume IV)***,Jaiprakash Nath Publications.
6. Murugeshan R,KiruthigaSivaprasath***Modern Physics***, S Chand & Company (2016)
7. R B Singh, ***Introduction to Modern Physics (Second Edition)***, New Age International (2009)
8. S L Kakani&ShubhraKakani, ***Modern Physics,*** Viva Books (2011)
9. Rajagopal P and Aruldhas G, ***Modern Physics,*** Prentice Hall of India (2009)
10. C L Arora & P S Hemne, ***Physics for Degree Students***, S Chand & Company. (2016)
11. S N Ghoshal, ***Atomic Physics***, S Chand & Company (2016)
12. H E White, ***Atomic Physics***, McGraw Hill
13. Richtmyer F K, Kennard E H & Cooper J N,***Introduction to Modern Physics (6e)***, McGraw Hill
14. Paul A Tipler& Ralph A Llewellyn, ***Modern Physics (Sixth Edition)***, W H Freeman (2012)
15. Sehgal, Chopra and Sehgal, ***Modern Physics***, Sultan Chand and Co.
16. M N Avadhanulu, ***A Text book of Lasers***, S Chand & Company (2016)
17. B B Laud, ***Lasers and Non-Linear Optics***, New Age International
18. D P Khandelwal, ***Optics and Atomic Physics***, Himalaya Publications
19. Satyaprakash, ***Optics and Atomic Physics***, Ratan Prakashan Mandir

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CBCS Scheme Syllabus (From 2016-17)
Subject: PHYSICS PRACTICALS
Semester V

Paper 5

List of Experiments:

1) Study of dielectric constant -Charging of Capacitor
2) LDR – Absorption Co-efficient of material of glass
3) Bridge rectifier Ripple factor for different filters
4) LASER – Wavelength using metal ruler
5) LASER – particle size
6) GM counter-Verification of inverse square law for Gamma rays
7) LCR Series Circuit-Phase measurement using CRO
8) Transistor characteristics-Load Line Analysis
9) Amplitude Modulation and Demodulation – BC547
10) BG-Determination of capacitance of Capacitance of Capacitor by absolute method
11) Fine Structure Constant –Sodium D lines using diffraction grating.
12) Basic Logic Gates –using diodes/Transistors

NOTE: 1) **Minimum of EIGHT experiments are to be performed**
2) **Any Relevant experiment can also be performed**

REFERENCES –

1. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
2. D C Tayal, ***University Practical Physics***, Himalaya Publishing House.
3. S P Singh, ***Advanced Practical Physics,*** Pragati Prakashan. Meerut, 1985.
4. Arora C.L., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
5. Khandelwal D.P., ***A Laboratory Manual of Physics for Undergraduate Classes***. Vani Publications.
6. Saraf B., ***Physics through Experiments,***Vikas Publishing House, New Delhi.
7. Harnam Singh & P S Hemne, ***B.Sc., Practical Physics,*** S. Chand and Company. New Delhi.
8. S L Gupta & V Kumar, ***Practical Physics***, Pragati prakashan, Meerut
9. Indu Prakash & Ramakrishna, ***A Text Book of Practical Physics (11e),*** Kitab Mahal, New Delhi.
10. R K Shukla & Anchal Srivastava, ***Practical Physics,***New Age Publishers, New Delhi
11. P B Zbar, A P Malvino & M A Miller, ***Basic Electronics: A Text Lab Manual,***Tata McGraw Hill, 2009.
12. S Panigrahi & B Mallick,***Engineering Practical Physics,***Cengage Learning, 2015.
13. Worsnop and Flint, **Advanced Practical Physics for Students,** Methuen and Company, London.

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GRADUATE PROGRAMME

Bachelor of Science (B.Sc.)

CBCS Scheme Syllabus (From 2016-17)

Subject : PHYSICS

Semester V

Paper 6:Molecular Physics, Nuclear Physics and Statistical Mechanics

(3Hours of Teaching per Week)

Module 1

Molecular Physics

Molecular Band- Band head and tail, molecular spectra-pure rotational spectrum and selection rules, Vibrational spectrum and selection rules. Rotational – Vibrational spectrum, Raman Scattering. Experimental study of Raman effect. Quantum theory of Raman effect. Applications of Raman effect.

Statistical Mechanics **6 hours**

Micro and macro systems, statistical nature of macro systems, statistics of distinguishable objects, Most probable distribution, Themodynamical probability, Maxwell-Botzmann distribution law. Indistinguishable particles. Bose-Einstein distribution law. Bose-Einstein Condensation, Fermi-Dirac Distribution, A qualitative comparison of three distribution laws.

7 hours

Module 2

Nuclear Physics I

Radioactivity: Theory of successive disintegration, radioactive equilibrium (secular and transient). Radioactive dating- Carbon dating.

α–decay- Characteristics of alpha spectrum, Range and disintegration energy of α–particle, Geiger- Nuttal law, Gamow's theory of α–decay.

β-decay, Types of β-decay (electron decay, positron decay and electron capture). Characteristics of β-spectrum and Pauli's neutrino hypothesis.

Nuclear Forces: Characteristics of Nuclear Forces, Yukawa's Meson Theory.

Nuclear Models : Liquid drop model, Shell model & Fermi Gas model of nucleus (Qualitative)

13 hours

Module 3

Nuclear Physics II

Detectors: GM Counter, Scintillation counter,

Accelerators: Construction, working and theory of Linear Accelerator, Cyclotron and Betatron,

Nuclear reactions: Types of reactions, Q value of a reaction, threshold energy (mention of expression). Conservation laws.

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Cosmic Rays: Discovery, Primary & Secondary Cosmic rays, Altitude and latitude effects, East west symmetry, cosmic ray showers, Baba's theory of origin of cosmic rays

13 hours

REFERENCES:

1. Arthur Beiser, ***Concepts of Modern Physics (Sixth Edition)***, Tata McGraw Hill (2003)
2. Kenneth S Krane, ***Modern Physics (Third Edition)***, John Wiley & Sons (2012)
3. Sundararajan N, George Thomas & Syed Azeez, ***College Physics***, United Publishers (2006).
4. B Basavaraj and P Sadashiva, ***B Sc Physics***, Omkar Publications (2016)
5. S L Gupta and Sanjeev Gupta, ***Unified Physics (Volume IV)***, Jaiprakash Nath Publications.
6. Murugeshan R,KiruthigaSivaprasath***Modern Physics***, S Chand & Company (2016)
7. R B Singh, ***Introduction to Modern Physics (Second Edition)***, New Age International (2009)
8. S L Kakani&ShubhraKakani, ***Modern Physics,*** Viva Books (2011)
9. Rajagopal P and Aruldhas G, ***Modern Physics,*** Prentice Hall of India (2009)
10. C L Arora & P S Hemne, ***Physics for Degree Students***, S Chand & Company. (2016)
11. S N Ghoshal, ***Nuclear Physics***, S Chand & Company (2016)
12. Richtmyer F K, Kennard E H & Cooper J N,***Introduction to Modern Physics (6e)***, McGraw Hill
13. Paul A Tipler& Ralph A Llewellyn, ***Modern Physics (Sixth Edition)***, W H Freeman (2012)
14. S B Patel, ***Nuclear Physics- An Introduction***, New Age International
15. Sehgal, Chopra and Sehgal, ***Modern Physics***, Sultan Chand and Co.
20. C N Banwell, ***Molecular Spectroscopy***, McGraw Hill
21. G Aruldas, ***Molecular Spectroscopy***, Prentice Hall of India.
22. Kenneth S Krane, ***Introductory Nuclear Physics,*** John Wiley & Sons
23. S P Kuila, ***Concepts of Nuclear Physics,*** New Central Book Agency (2010)

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Bachelor of Science (B.Sc.)

CBCS Scheme Syllabus (From 2016-17)

Subject: PHYSICS PRACTICALS

Semester V

Paper 6

List of Experiments :

1) Solar cell characteristics- I-V & Power –Load Charactristics
2) Resolving power of prism
3) CE amplifier –Frequency Responce Curves and Gain Band Band width.
4) The excitation energy & force constant of iodine molecule
5) e/m of Electron by Thomson's method
6) GM counter characteristics
7) Rydberg constant – hydrogen spectrum/ solar spectrum
8) 'h' by photo cell
9) Determination of Fermi energy of copper using meter bridge
10) Refractive Index of Glass TIR –using Laser
11) FET Characteristics
12) BG- High resistance by leakage.

NOTE: 1) **Minimum of EIGHT experiments are to be performed**
2) **Any Relevant experiment can also be performed**

REFERENCES –

1. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
2. D·C Tayal, ***University Practical Physics***, Himalaya Publishing House.
3. S P Singh, ***Advanced Practical Physics,*** Pragati Prakashan. Meerut, 1985.
4. Arora C.L., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
5. Khandelwal D.P., ***A Laboratory Manual of Physics for Undergraduate Classes***. Vani Publications.
6. Saraf B., ***Physics through Experiments,***Vikas Publishing House, New Delhi.
7. Harnam Singh & P S Hemne, ***B.Sc., Practical Physics,*** S. Chand and Company. New Delhi.
8. S L Gupta & V Kumar, ***Practical Physics***, Pragati prakashan, Meerut
9. Indu Prakash & Ramakrishna, ***A Text Book of Practical Physics (11e),*** Kitab Mahal, New Delhi.
10. R K Shukla & Anchal Srivastava, ***Practical Physics,***New Age Publishers, New Delhi
11. P B Zbar, A P Malvino & M A Miller, ***Basic Electronics: A Text Lab Manual,***Tata McGraw Hill, 2009.
12. S Panigrahi & B Mallick,***Engineering Practical Physics,***Cengage Learning, 2015.
13. Worsnop and Flint, **Advanced Practical Physics for Students,** Methuen and Company, London.

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CBCS Scheme Syllabus (From 2016-17)

Subject: PHYSICS

SEMESTER – VI

Paper 7: Electronics, Solid State Physics & Nano materials

(3Hours of Teaching per Week)

Module I

Electronics: Transistors-DCand AC current gains DC and AC load Lines-operating point, Self-biasing of Transistor(Voltage divider method). Single Stage CE amplifier, h-parameters, Expressions for Voltage, current and power gain using h-parameters.

Operational Amplifiers: Symbol, characteristics of ideal op-amp, concept of virtual ground, inverting andnon-inverting amplifiers (Theory), Mention of Applications of op-amp.

Oscillators: Concept of feedback-Positive and negative feedback, Barkhausen criteria, Wein Bridge and Phase shift oscillators (construction and working using IC741, Multivibrators – Types (brief), Astable multivibrator-Circuit Operation(using IC555).

Digital Electronics : Analog and Digital signals, Construction of OR, AND gate using diodes, NOT Logic gate using Transistor,Symbols and Truth Tables of NOR, NAND and XOR Logic gates. Boolean Algebra(brief), De-Morgan's Theorems, Boolean expressions(Simple) -Implementation by Basic Logic gates.

13 hours

Module II

Solid state Physics

Crystal Structure: Concept of Lattice, unit cell,Bravias Lattice,crystal plane,crystal systems and Miller indices.X-ray diffraction- Bragg's Law,Bragg's Spectrometer, Crystal structure of NaCl.

Specific heat of solids: Dulong and Petit's law.Einstein'sTheory of specific heat of solids, LatticeVibration-Phonons(Brief),Debye's Theory of Specific Heat of Solids.

Free electron theory of Metals: The classical free electron theory of metals- expression of electrical conductivityand thermal conductivity (derivation)– Wiedemann-Franz Law, Limitations of classical theory, Quantum free electron theory-Energy states of free electrons in Metals-Statement of density of states.Expression for Fermi energy and average energy.

13 hours

Module III

Band theory of solids: Origin of bands in solids,intrinsic and extrinsic semiconductors,Electrical conductivity of Intrinsic Semiconductor- expression for carrier concentration in intrinsic semiconductors-Band Gap(derivation), Fermi level in case of intrinsic and extrinsic semiconductors (qualitative), Hall effect - expression for Hall coefficient,experimental determination and applications.

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Superconductivity: Experimental facts (Transition temperature, persistent current, effect, Meissner effect), Critical magnetic field,BCS theory, Josephson's effect(AC & DC), & Type II superconductors - Applications of Superconductors- Maglev & Squids (Brief).

Magnetic materials: Langevin's theory of Diamagnetism and paramagnetism,Curie Law, Domain theory of Ferromagnetism (Qualitative).

Nanomaterials: Introduction,Properties of Nanoparticles (Mechanical, Optical, Magnetic and Electronic), Preparation of nanomaterials (Bottom up and Top-down approaches), Quantum nano structures:quantum wells,wires and dots. Graphene and Fullerene (Brief), Carbon Nanotubes - properties and uses, Synthesis for CNT (high pressure carbon monoxide deposition and chemical vapour deposition),Applications of Nanotechnology.

13 hours

REFERENCES:

1. V K Mehta & Rohit Mehta, ***Principles of Electronics,***S Chand & Company (2016)
2. S L Gupta and Sanjeev Gupta, ***Unified Physics (Volume IV),***Jaiprakash Nath Publications.
3. R S Sedha, ***Elements of Electronics,***S Chand & Company
4. D Roy Choudary & Sheel B Jain, ***Linear Integrated Circuits (4e),*** New Age International
5. Thomas L Floyd, ***Digital Fundamentals (9e),*** Pearson
6. Albert Malvino & David J Bates, ***Electronic Principles (7e),***Tata McGraw Hill
7. S O Pillai , ***Solid State Physics,*** New Age International
8. M Ali Omer, ***Solid State Physics,*** Pearson Education
9. Charles Kittel, ***Introduction to Solid State Physics,*** John Wiley & Sons.
10. J P Srivatsava, ***Solid State Physics,*** Prentice Hall of India
11. Sundararajan N, George Thomas & Syed Azeez, ***College Physics,*** United Publishers (2006).
12. B Basavaraj and P Sadashiva, ***B Sc Physics,*** Omkar Publications (2016)
13. Rajagopal P and Aruldhas G, ***Modern Physics,*** Prentice Hall of India (2009)
14. Murugeshan R,KiruthigaSivaprasath***Modern Physics,*** S Chand & Company (2016)
15. R B Singh, ***Introduction to Modern Physics (Second Edition),*** New Age International (2009)
16. S L Kakani&ShubhraKakani, ***Modern Physics,*** Viva Books (2011)
17. C L Arora & P S Hemne, ***Physics for Degree Students,*** S Chand & Company (2016)
18. Paul A Tipler& Ralph A Llewellyn, ***Modern Physics (Sixth Edition),*** W H Freeman (2012)
19. Sehgal, Chopra and Sehgal, ***Modern Physics,*** Sultan Chand and Co.
16. Arthur Beiser, ***Concepts of Modern Physics (Sixth Edition),*** Tata McGraw Hill (2003)
17. Kenneth S Krane, ***Modern Physics (Third Edition),*** John Wiley & Sons (2012)

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Subject: PHYSICS PRACTICALS
Semester VI

Paper 7

List of Experiments:

1) Photodiode-characteristics
2) Study of Hysteresis Curve for a Ferromagnetic Substance
3) RI of a Liquid using Hollow Prism.
4) Astable Multivibrator-IC555
5) Zener diode – characteristics – voltage regulation
6) Phase shift oscillator using transistor
7) Operational amplifier – IC 741-Difference amplifier
8) Energy gap of Thermistor using meter bridge.
9) Verification of De Morgan's Laws using ICs
10) Triode Valve Characteristics
11) NAND Gate as Universal Gate.
12) Transistor Characteristics-CE Configuration

NOTE: 1) **Minimum of EIGHT experiments are to be performed**
2) **Any Relevant experiment can also be performed**

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1. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
2. D C Tayal, ***University Practical Physics***, Himalaya Publishing House.
3. S P Singh, ***Advanced Practical Physics,*** Pragati Prakashan. Meerut, 1985.
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5. Khandelwal D.P., ***A Laboratory Manual of Physics for Undergraduate Classes***. Vani Publications.
6. Saraf B., ***Physics through Experiments,*** Vikas Publishing House, New Delhi.
7. Harnam Singh & P S Hemne, ***B.Sc., Practical Physics,*** S. Chand and Company. New Delhi.
8. S L Gupta & V Kumar, ***Practical Physics***, Pragati prakashan, Meerut
9. Indu Prakash & Ramakrishna, ***A Text Book of Practical Physics (11e),*** Kitab Mahal, New Delhi.
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Bachelor of Science (B.Sc.)

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PHYSICS

SEMESTER – VI

Paper 8: Relativity, Astrophysics, Quantum Mechanics and Space Physics

(3 Hours of Teaching per Week)

Module I: RELATIVITY

The Special Theory of Relativity: Limitations of classical (Galilean) Relativity, The Michelson-Morley Experiment (Theory), Postulates of the Special Theory of Relativity, Lorentz Transformation (No derivation), Relativity of Simultaneity, Length Contraction, Time dilation.

6 hours

Relativistic Mechanics: Relativistic transformation of velocity (derivation), relativistic variation of mass (derivation), Einstein's mass energy equivalence($E=mc^2$ - derivation) with illustrations, Energy-momentum relation, Relativistic Doppler Effect (Derivation).

7 hours

Module II: QUANTUM MECHANICS

Matter Waves: Concept of Matter Waves- de Broglie hypothesis, Characteristics of matter waves, Group and phase velocity of matter Waves, relation between group and phase velocity (derivation), experimental evidence for existence of matter waves ,Davison-Germer Experiment withTheory.

3 hours

Heisenberg's Uncertainty Principle: Statement, explaination and illustration (gamma ray microscope experiment-(quantitative), Applications of the Uncertainty Principle - The size of an atom, non-existence of electrons inside the nucleus.

3 hours

Principles of Quantum Mechanics: concept of wave function, Properties of wave function, Physical significance (Born's interpretation of the wave function), Normalisation of wave function. Basic postulates of quantum mechanics, Operators in quantum mechanics (Mention – position, momentum, Kinetic and Total energy).

3 hours

Schrodinger Wave Equation: Schrodinger's Wave Equation in time independent and time dependent forms (derivation), Application of Schrodinger's equation to particle in one dimensional box - wave function & energy values (derivation). Qualitative discussion of Simple Harmonic Oscillator (expression for energy, energy level diagram and Zero point energy).

4 hours

Module III: ASTROPHYSICS & SPACE PHYSICS

Stars-Stellar Parallax-Parallax method of determining the stellar distance,units of stellar distance(Light year and parsec),Stellar Magnitude (Hipparchus magnitude Scale -apparent and absolute magnitudes & their relations), Stellar Spectra – Colour index, U-B-V

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system, Harvard Classification Scheme for Stars, Stellar Mass and size, HR Diagram and its importance.

4hours

Stellar Structure: Hydrostatic equilibrium, Basic Equations of stellar structure (Mention of equations for mass conservation & momentum conservation), Virial Theorem, Linear density model of a star - Expression for internal pressure and temperature of a star, Mass-Luminosity Relation, Photon diffusion Time (Qualitative).

4hours

Stellar Evolution: Block diagram of Stellar Evolution – Qualitative discussion of different stages of Stellar Evolution (Formation, main sequence stage, red giant stage and death stage), super dense remnants – White dwarf- Chandrasekhar limit, neutron star and black hole (qualitative- mass limits and expression for radius).

3hours

Space Physics: Solar atmosphere (Photosphere, Chromosphere & Corona), electromagnetic radiations from the sun, Solar wind, solar cycles.

2 hours

REFERENCES:

1. Arthur Beiser, ***Concepts of Modern Physics (Sixth Edition)***, Tata McGraw Hill (2003)
2. Kenneth S Krane, ***Modern Physics (Third Edition)***, John Wiley & Sons (2012)
3. Sundararajan N, George Thomas & Syed Azeez, ***College Physics***, United Publishers (2006).
4. Rajagopal P and Aruldhas G, ***Modern Physics,*** Prentice Hall of India (2009)
5. Murugeshan R,KiruthigaSivaprasath, ***Modern Physics***, S Chand & Company (2016)
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7. S L Kakani&ShubhraKakani, ***Modern Physics,*** Viva Books (2011)
8. C L Arora & P S Hemne, ***Physics for Degree Students,***S Chand & Company.(2016)
9. Paul A Tipler& Ralph A Llewellyn, ***Modern Physics (Sixth Edition)***, W H Freeman (2012)

RELATIVITY

1. P L Sardesai,***A Primer of Special Relativity***, New Age International (2004)
2. Satyaprakash, ***Relativistic Mechanics***, PragatiPrakashan.
3. Robert Resnick, ***Introduction to Special Theory of Relativity,***John Wiley & Sons (1968)
4. A P French, ***Special Relativity***, W W Norton & Company (1968)

QUANTUM MECHANICS

1. Kamal Singh&S P Singh, ***Elements of Quantum Mechanics,***S Chand & Company (2013)
2. S P Kuila, ***Perspective of Quantum Mechanics,*** New Central Book Agency (2010)
3. David J Griffiths, ***Introduction to Quantum Mechanics(3e)***, Pearson Education(2005)
4. Bransden B H and Joachain C J, ***Quantum Mechanics(2e),*** Pearson Education (2000)
5. NouredineZettili,***Quantum Mechanics(Second Edition),*** John Wiley & Sons (2009)

ASTROPHYSICS & SPACE PHYSICS

1. BaidarinathBasu***An Introduction to Astrophysics (Second Edition),*** Prentice Hall of India
2. K.S. Krishnaswamy, ***Astrophysics : A Modern Perspective***, New Age International (2006)
3. Stein R F & A G W Cameron, ***Stellar Evolution***, Plenum (1966)
4. Abhyankar K D, ***Astrophysics of Stars and Galaxies***, Universities Press.

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GRADUATE PROGRAMME

Bachelor of Science (B.Sc.)

CBCS Scheme Syllabus (From 2016-17)

Subject: PHYSICS PRACTICALS

Semester VI

Paper 8

List of Experiments:

1. Realisation of Boolean expression – using Logic ICs
2. Determination of Work function using diode valve.
3. Logic gates – IC7400
4. Flip Flops (RS) – IC 7400
5. Phase Shift Oscillator
6. Operational Amplifier as summing amplifier
7. Astable Multivibrator –Transistor Circuit
8. Wein bridge oscillator
9. Determination of Boltzmann's Constant using diode
10. BG - Determination of mutual inductance by absolute method
11. Transistor characteristics- calculation of h parameters.
12. Operational Amplifier –Inverting & non Inverting

NOTE: 1) **Minimum of EIGHT experiments are to be performed**

2) **Any Relevant experiment can also be performed**

REFERENCES –

1. Chattopadhyaya D., Rakshit P.C & B. Saha, **An Advanced Course in Practical Physics,** New Central Book Agency (P) Limited.Kolkata.
2. D C Tayal, ***University Practical Physics***, Himalaya Publishing House.
3. S P Singh, ***Advanced Practical Physics,*** Pragati Prakashan. Meerut, 1985.
4. Arora C.L., **B.Sc., Practical Physics,** S. Chand and Company., New Delhi.
5. Khandelwal D.P., ***A Laboratory Manual of Physics for Undergraduate Classes***. Vani Publications.
6. Saraf B., ***Physics through Experiments,***Vikas Publishing House, New Delhi.
7. Harnam Singh & P S Hemne, ***B.Sc., Practical Physics,*** S. Chand and Company. New Delhi.
8. S L Gupta & V Kumar, ***Practical Physics***, Pragati prakashan, Meerut
9. Indu Prakash & Ramakrishna, ***A Text Book of Practical Physics (11e)***, Kitab Mahal, New Delhi.
10. R K Shukla & Anchal Srivastava, ***Practical Physics***,New Age Publishers, New Delhi
11. P B Zbar, A P Malvino & M A Miller, ***Basic Electronics: A Text Lab Manual,***Tata McGraw Hill, 2009.
12. S Panigrahi & B Mallick,***Engineering Practical Physics,***Cengage Learning, 2015.
13. Worsnop and Flint, **Advanced Practical Physics for Students,** Methuen and Company, London.

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