MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. Programs Course = CBCS

DETAILED CURRICULUM:

Core course- PHYSICS-

PHY-CC-103(Theory)

PHY-CC-104(Practical)

- The Course content has been designed on **Semester pattern**.
- There shall be **01 Theory** papers having **04 unit**(4 lectures in a week set up by departments)
- There shall be **02 Practical** 6 lectures in a week set up by departments.
- There shall be **01 Theory** paper of **70 marks** and 2:30 hours duration in University Examination.
- There shall be **01 Practical Paper(One experiment from each section i.e. two experiment)** of **100 marks** and 04:00 hours duration in University Examination.
- **There shall be Continuous Internal Evaluation of 30 Marks for theory course.**

Course Type	Paper No.	Title of Paper	TOTAL MARKS EXT.+INT* = TOTAL	Passing Standarads EXT.+INT* = TOTAL	TOTAL TEACHING HOURS (In 15weeks)	CREDITS
Core Course Theory -103	Paper PHY-CC-103	Vector and Classical Mechanics, Interference and Diffraction, Properties of Matter and Simple Harmonic Motion, Diode Circuits - Network Theorems and X-Ray	70+30* =100	28+12* =40 marks	60 hrs	04
Core Course Practical-104	Paper PHY-CC- 104	PRACTICAL PHYSICS-1	EXT 100	40 marks	90 hrs	06
TOTAL			**170+30= 200**		**150 hrs**	**10**

INTERNAL EVALUATION :

Test	:	15 Marks
Assignment/Presentation	:	10 Marks
Seminar/Attendance	:	05 Marks
Total	:	30 Marks

B.Sc. (PHYSICS)
SEMESTER-1

Syllabus for UG B.Sc. Programs Course = CBCS Course No.- PHY-CC- 103(Theory)

Title of the Paper : **Vector and Classical Mechanics, Interference and Diffraction, Properties of Matter and Simple Harmonic Motion,**
Diode Circuit - Network Theorem and X-Ray

Credits: 04
Marks: 100

Marks: Semester End Examination: 70
Internal Examination : 30
TOTAL 100

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Vector and Classical Mechanics** ➢ Surface area as vector ➢ Scalar triple product ➢ Geometrical interpretation of scalar triple product ➢ Rotational behavior of scalar triple product ➢ Vector triple product ➢ Multi vectors product ➢ Reciprocal vector ➢ Newton's Laws of motion ➢ Mechanics of a particle ➢ Equation of motion of a particle ➢ Motion under constant force ➢ Motion under a force which depends on time only ➢ Motion under a force dependent on distanceonly ➢ Motion of a particle subjected to a resistiveforce ➢ Examples	15	18
2	**Interference and Diffraction** ➢ Condition of interference ➢ Interference by thin film ➢ Interference due to transmitted light ➢ Interference by variable thickness (wedge-shaped) film ➢ Types of interference : Wave front division and Amplitude division ➢ Wave front division :Fresnel Biprism ➢ Amplitude division : Newton's ring ➢ Fresnel's Assumptions ➢ Fresnel Half Period Zones and Rectilinear propagation of light ➢ Positive and Negative Zone plate ➢ Fraunhoffer diffraction at a single slit ➢ Intensity distribution in diffraction pattern of a single slit in fraunhoffer diffraction ➢ Examples	15	18

	Properties of Matter and Simple Harmonic Motion ➢ Definition of stress and strain ➢ Hooke's law and elastic constant ➢ Strain energy ➢ Restoring couple- required to produce torsion andelastic wire with derivation ➢ Relation between isothermal and adiabatic elasticities of gases ➢ Searl's relation between elastic constant and derivations ➢ Characteristics of simple harmonic motion ➢ Graphical Method: Composition of two linear simple harmonic motions in the same direction and at right angles with each other ➢ Analytical Method : Composition of two linear simple harmonic motions in the same direction and at right angles with each other ➢ Lissaious figures ➢ Compound pendulum and derivation of time period ➢ Examples	15	17
4	**Diode Circuits , Network Theorems and X-Ray** ➢ The Half wave Rectifier ➢ The Full wave Rectifier ➢ The Bridge Rectifier ➢ Types of Filter ➢ Super-Position Theorem ➢ Norton's Theorem ➢ Thevenin's Theorem ➢ Origin , Production and Properties of X-ray ➢ Laue spot ➢ Absorption of X-ray ➢ Application of X-ray ➢ Compton effect ➢ Examples	15	17
		60hours	**70marks**

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Classical Mechanics,Interference and Diffraction, Properties of Matter ,Simple Harmonic Motion, Network Theorem and their applications.

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-1

Syllabus for UG B.Sc. Programs Course = CBCS Credits: 06

Course No.- PHY-CC-104

Title of the Paper: Physics Practical

Marking Scheme : Semester End Examination: 100

TOTAL 100

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper P- 103]

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

Detailed Syllabus for Physics practical	Teaching Hours
SECTION A(General Physics)	
1. To determine Young's modulus of a given wire.	03
2. To determine expansion coefficient of pressure of constant volume air thermometer and to determine absolute zero temperature and atmospheric pressure.	03
3. To determine moment of inertia of body with different shapes using bi-filler suspension.	03
4. Calibration of spectrometer with help of prism spectra.	03
5. To determine wavelength of sodium light using Newton's ring.	03
6. To determine refractive index of liquid by using liquid lens method.	03
7. To determine 'g' by bar pendulum .	03

Detailed Syllabus for Physics practical	Teaching Hours
SECTION B(Electricity and Magnetism)	
1. To determine wattage and temperature of a given lamp.	03
2. To verify tangent's law using tangent galvanometer.	03
3. To determine low resistance using projection method.	03
4. To determine magnetic moment and pole strength using deflection magnetometer.	03
5. To study bridge rectifier.	03
6. To determine Impedance of coil using series L-R ac circuit.	03
7. To study characteristics ofthermistor.	03

References Books

1) Mathematical physics by H.K.Das &Dr. Rama Verma
2) Mathematical physics by Rajput
3) Nirav college physics paper:101
4) Nirav college physics paper:102
5) Introduction to classical mechanics by R.G.Takwale & P.S. Puranik
6) Classical Mechanics & Properties of Matter by A.B.Gupta
7) A textbook of optics by Dr. N. Subrahmanyam & Brij Lal
8) Optics by Singh & Agarwal
9) Properties of matter by D.S.Mathur
10) Electricity and Magnetism by D.N.Vasudev
11) Electric circuit analysis by Soni & Gupta
12) Electricity and Magnetism by R.Murugeshan
13) Nirav college physics paper :202
14) Modern physics by Murugeshan
15) Modern physics by Basier
16) Engineering physics by Dr. M.N.Avadhanulu (S.CHAND'S)
17) Advanced practical physics by Chauhan And Singh
18) B.Sc.Practical Physics by C L Arora
19) Practical Physics by Kumar and Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

Syllabus for UG B.Sc. Programs Course = CBCS

DETAILED CURRICULUM

Core course- PHYSICS PHY-CC-203(Theory)

PHY-CC-204(Practical)

- The Course content has been designed on **Semester pattern**.
- There shall be **01 Theory** papers having **04 unit** (4 lectures in a week set up by Departments)
- There shall be **02 Practical** 6 lectures in a week set up by departments.
- There shall be **01 Theory** paper of **70 marks** and 2:30 hours duration in University Examination.
- There shall be **01 Practical Paper(One experiment from each section i.e. two experiment)** of **100marks** and 04:00 hours duration in University Examination.
- **There shall be Continuous Internal Evaluation of 30 Marks for theory course.**

Course Type	Paper No.	Title of Paper	TOTAL MARKS EXT.+INT* = TOTAL	Passing Standarads EXT.+INT* = TOTAL	TOTAL TEACHING HOURS (In 15weeks)	CREDITS
Core Course Theory-203	Paper PHY- CC-203	Thermodynamics and entropy, Magnetism and Solid State Physics, AC Bridge and DC Circuit, Modern Physics (Radioactivity) and Relativity	70+30* =100	28+12* =40 marks	60 hrs	04
Core Course Practical -204	Paper PHY- CC-204	PRACTICAL PHYSICS-2	EXT 100	40 marks	90 hrs	06
	TOTAL		**170+30= 200**		**150 hrs**	**10**

INTERNAL EVALUATION :

Test	:	15 Marks
Assignment/Presentation	:	10 Marks
Seminar/Attendance	:	05 Marks
Total	:	30 Marks

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. PHYSICS

SEMESTER-2

Syllabus for UG B.Sc. Programs Course = CBCS Course No.- PHY-CC- 203(Theory)

Title of the Paper : **Thermodynamics and entropy, Magnetism and Solid State Physics, AC Bridge and DC Circuit, Modern Physics(Radioactivity) and Relativity**

Credits: 04

Marks: 100

Marks: Semester End Examination: 70

Internal Examination : 30

TOTAL 100

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Thermodynamics and entropy** ➢ Zeroth,first and second law of thermodynamics ➢ Specific heat of gases ➢ Application of first law of thermodynamics ➢ Adiabatic equation of perfect gas ➢ Carnot's theorem ➢ Thermodynamic scale of temperature ➢ Identity of perfect gas and absolute scale of temperature ➢ Change of entropy in reversible and irreversibleprocess ➢ Principle of increase of entropy and disorder ➢ Third law of thermodynamics in terms of entropy ➢ Temperature – Entropy diagram ➢ Calculation of entropy for a perfect gas and stream ➢ Impossibility of attaining the absolute zero ➢ Maxwell's relations ➢ Derivation of Clausius - Claperon equation of agas ➢ Examples	15	18
2	**Magnetism and Solid State Physics** ➢ Classification of Magnetic Materials: Diamagnetic, Paramagnetic, Ferromagnetic ➢ Magnetic Properties of materials ➢ Langevin's theory for diamagnetic materials(Classical) ➢ Hysteresis loop for ferromagnetic substances ➢ Ferromagnetic domains ➢ Tangent law ➢ The concept of lattice ➢ Primitive cell and unit cell ➢ 7 crystal systems and 14 Bravis lattice ➢ Elementary crystal structures : Nacl, ZnS, Diamond , H.C.P. ➢ Atomic packing factors ➢ Examples	15	18

3	**AC Bridge and DC Circuit** ➢ A.C.Bridge introduction and general Bridge balance equation ➢ De-sautty Bridge ➢ Maxwell Bridge ➢ Anderson Bridge ➢ R.L. Circuit in series growth and decay ➢ R.C. circuit in series growth and decay ➢ Series LCR circuit and its analysis and condition of oscillation ➢ Quality factor ➢ Examples	15	17
4	**Modern Physics(Radioactivity) and Relativity** ➢ Thermal radiation and Black body radiation ➢ Planck's radiation law ➢ Rayleigh – Jeans law ➢ Wien's law and Wien's Displacement law ➢ De Broglie hypothesis ➢ Uncertainty principle ➢ Laws of Disintegration : Activity and its units , Half-life , Average life (Mean) ➢ Radioactive series ➢ Law of successive Disintegration ➢ Radioactive Equilibrium: 1) Permanent or secular equilibrium 2) Transient equilibrium ➢ Frame of reference and Newtonian Relativity ➢ Galilean transformation equations ➢ The Ether hypothesis and the Michelson-Morleyexperiment with result ➢ Postulates of special theory ofrelativity ➢ The Lorentz transformation equations ➢ Length contraction and Time dilation ➢ Mass energy equivalence (E=mc2) ➢ Examples	15	17
		60hours	**70marks**

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Thermodynamics , Magnetism ,Solid State Physics, Modern Physics, Relativity and their applications.

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. PHYSICS SEMESTER-II

Syllabus for UG B.Sc. Programs Course = CBCS Credits: 06

Course No.- PHY-CC- 204

Title of the Paper: **Physics Practical**

Marking Scheme : Semester End Examination: 100

TOTAL **100**

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper P- 203]

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

Detailed Syllabus for Physics	**Teaching Hours**
SECTION A(General Physics)	
1. To determine temperature coefficient of thermal conductivity by Lee's method.	03
2. To determine wavelength of mercury spectral lines with the help ofgrating method.	03
3. To determine Poisson's ratio of rubber tube.	03
4. To study resonator to determine unknown frequency of tuning fork.	03
5. To determine Melde's tuning fork frequency and to verify laws ofvibrating string.	03
6. To determine radius of curvature of a given lens and refractive indexof glass using optical lever method.	03
7. To determine moment of inertia of a disk using Tortional pendulum.	03
SECTION B(Electricity and Magnetism)	
1.To determine resistivity of electrolyte using Koholaraus bridge.	03
2.To determine ratio of magnetic moments of two bar magnetsusing vibration magnetometer.	03
3.To determine resistance of galvanometer and Leclance cell usingP.O.Box Kelvin-Mens methods.	03
4.To study magnetic field of coil using Stuart gee galvanometer.	03
5.To determine self-inductance of a given coil using Anderson bridge.	03
6.To determine ratio of capacity of two capacitors using desautybridge.	03
7.To study parallel resonance of L.C.R. circuit.	03

References Books

1) Thermodynamics and statistical physics by J.P. Agarwal
2) Electricity and Magnetism by D.N.Vasudev
3) Electricity and Magnetism by R.Murugeshan
4) Elements of Solid State Physics by S.O.Pillai
5) Nirav college physics
6) Electricity and Electronics by D.C.Tayal
7) Electric circuit analysis by Soni &Gupta
8) Nirav college physics paper :102
9) Modern physics by Murugeshan
10) Modern physics by Basier
11) Modern physics by Aruldas & P Rajagopal
12) Introduction to Nuclear and Particle Physics By V.K.Mittal & R.C. verma
13) Advanced practical physics by Chauhan And Singh
14) B.Sc.Practical Physics by C L Arora
15) Practical Physics by Kumar and Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

DETAILED CURRICULUM

SEMESTER PATTERN

CHOICE BASED PATTERN

B.Sc. (PHYSICS) SEMESTER-III

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practical is allotted on Semester pattern.
- There shall be **02 Theory papers 70 marks each** of 2:30Hours duration.
- [70+30 marks Internal =100marks]
- Physics Practical Examination shall be of 10**0 marks** of 06 **hours duration** in University
- Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-3 & 4)

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT*= TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDI TS
1	**PHY CC-303**	THEORY	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
2	**PHY CC-304**	THEORY	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
3	**PHY CC-305**	PRACTICAL	100	40	15 WEEKS X 9 HOURS =135	06	06

INTERNAL EVALUATION :

Test	:	15 Marks
Assignment/Presentation	:	10 Marks
Seminar/Attendance	:	05 Marks
Total	:	30 Marks

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc.(PHYSICS) SEMESTER-III

PAPER-CC-303: Classical Mechanics, Thermodynamics and Statistical Mechanics, Optics -1 and Thermoelectricity , Spectroscopy-1

Credits: 04

Marks: **100 Marks**
Semester End Examination of: **70Marks**
Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Classical Mechanics** ➢ Equivalent one body problem ➢ Motion in a central force field ➢ Unit vector in polar co-ordinate system ➢ Radial and tangential acceleration component inpolar co-ordinate system ➢ General features of the motion ➢ Equation of the orbit ➢ Types of the orbit ➢ Examples	15	18
2	**Thermodynamics and Statistical Mechanics** ➢ Macroscopic States, Microscopic States ➢ Fluctuations and their dependence on N molecules ➢ Phase space, Phase trajectory, Density distribution in the phase space ➢ Volume in phase space ➢ Division of phase space into cells ➢ μ-Space and Γ-Space ➢ Concept of ensemble ➢ Types of ensemble ➢ General statistical distribution law ➢ Thermodynamic probability ➢ β– Parameters ➢ Entropy & probability ➢ Law of equipartition of energy ➢ Boltzmann Cannonical distribution and evaluation of its constants ➢ Maxwell-Boltzmann distribution law of velocities ➢ Examples	15	18

3	**Optics -1 andThermoelectricity** ➢ Resolving power ofgrating ➢ Resolving power of Prism ➢ Resolving power of Telescope ➢ Comparison of grating spectra & prism spectra ➢ Introduction to Eye pieces: (1) Kellner eyepiece (2) Ramsden eyepiece (3) Huygens's eyepiece (4) Gauss eyepiece ➢ Comparison of Ramsden eyepiece and Huygens's eyepiece ➢ Michelson Interferometer ➢ Febry – Perot Interferometer ➢ Seeback Effect ➢ Laws of thermo e.m.f. ➢ Measurement of Thermo EMF using Potentiometer ➢ Peltier Effect ➢ Thomson Effect ➢ Thermodynamics of Thermocouple ➢ Thermo-Electric Diagrams ➢ Uses of Thermoelectric Diagrams ➢ Examples	15	17
4	**Spectroscopy-1** **ATOMIC AND MOLECULAR SPECTROSCOPY** ➢ Different Series in alkali spectra ➢ Ritz combination principle ➢ Term values in alkali spectra and quantum defect ➢ Spin orbit interaction ➢ Explanation of salient features of alkali spectra ➢ Doublet structure in alkali spectra ➢ Alkali like spectra ➢ Spectra of alkaline earths ➢ Explanation of rotational spectra as a rigid rotator ➢ Explanation of vibration spectra as a harmonic oscillator	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Classical Mechanics, Thermodynamics , Optics and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-303:

1) Introduction to classical mechanics by R. G. Takwale & Puranik
2) Introduction to classical mechanics by Shrivastava & Gupta
3) Fundamental of statistical Mechanics by B. B. Laud (New Age International)
4) Elementary statistical mechanics by Gupta & Kumar (PragatiPrakashan)
5) Thermodynamics and statistical physics by Aggarwal and Satyaprakash (Pragatiprakashan)
6) Principles of Optics by B. K. Mathur
7) A textbook of optics by Dr. N. Subrahmanyam & BrijLal
8) Optics by Singh & Agarwal
9) Electricity and Magnetism by D. N. Vasudev
10) Electricity and Magnetism by R. Murugeshan
11) Elements of spectroscope by Gupta, Kumar and Sharma
12) Molecular Spectroscope by G. King

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-III

PAPER-CC-304: Mathematical Physics-1, Electricity, Electrostatics, Electronics-1 Instrumentation and Number System

Credits: 04

Marks: **100 Marks**

Semester End Examination of: **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Mathematical Physics-1** ➢ Definition of Complex number ➢ Complex number: Addition , Subtraction, Multiplication and Division ➢ complex numbers representation in argand plane and polar plane ➢ Conjugate of complex number ➢ Analytic function ➢ Cauchy Riemann Condition ➢ Definition of Green's Theorem ➢ Cauchy's integral theorem for simply and multiply connected region ➢ Cauchy's integral formula ➢ Taylor series : Definition and theorem ➢ Laurent series : Definition and theorem ➢ Examples	15	18
2	**Electricity** ➢ Types of Galvanometer: (1) Moving iron Galvanometer (2) Electrodynamometer (3) Moving Coil Galvanometer: Ballistic and Dead beat Galvanometer ➢ Force of damping ➢ Equation of Damped Simple Harmonic Oscillator for Ballistic and Dead beat galvanometer ➢ Logarithmic decrement of Ballistic Galvanometer ➢ Types of damping ➢ Hall effect in conductor ➢ Hall probe ➢ Wattmeter : (1) Thomson Wattmeter (2) Induction type wattmeter ➢ Examples	15	18
3	**Electrostatics** ➢ Poisson's and Laplace's equation ➢ Solution of Laplace's equation in Cartesian Co-ordinate system ➢ Electrical Images ➢ Capacity of cylindrical condenser ➢ Capacity of spherical condenser	15	17

	➢ Capacity of a Parallel Plate condenser ➢ Energy of charged Condenser ➢ Type of Capacitor and Uses of Capacitor ➢ Effect of Dielectric ➢ Examples		
4	**Electronics-1 Instrumentation and Number System** ➢ Transistor load line analysis ➢ Operating points ➢ Faithful Amplification ➢ Stabilization and stability factor ➢ Transistors Biasing : Voltage Divider Bias method ➢ Feedback amplifier : (1) Type of feedback amplifier (2) Derivation of voltage gain with feedback amplifier ➢ Oscillator : (1) Tank circuit (2) BarkhausenCriterion (3) Colpitt's Oscillator (4) HartleyOscillator (5) Phase shift Oscillator ➢ G M Counter ➢ Jamin Interferometer ➢ Oscilloscope ➢ Function generator ➢ Number system in digital electronics: Mutual conversion of decimal and binary numbers, Addition, subtraction, multiplication of binary number ➢ Examples	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Mathematical Physics, Electricity, Electrostatics, and their applications

TEXT BOOKS RECOMMENDED FOR PAPER PHY-CC-304

1. Mathematical Physics by P. K. Chatopadhyay (Wiley EasternLimited)
2. Mathematical Physics by S. Chand
3. Mathematical Physics by MaryBose
4. Mathematical Physics by Rajput
5. Fundamental of Magnetism & Electricity by D. N. Vasudeva (S. Chand &Comm.)
6. Electricity and Magnetism by R. Murugeshan (S. Chand)
7. Principle of Electronics by V. K. Mehta and Rohit Mehta
8. Hand Book of Electronics by Gupta and Kumar(Prgati Prakashan)
9. Digital Electronics by A. Anand
10. Electrodynamics by S. L. Gupta & V. Kumar (S. P. Sinsh, Pragati prakshan)
11. Introduction to Electrodynamics by D. J. Griffith

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-III

PHY-CC-305: PRACTICAL (Based on paper P- 303 & 304)

Credits: 06

Marks: Semester End Examination: **100 Marks**

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

Detailed Syllabus for Physics practical	Teaching Hours
SECTION A (General Physics: Heat ,Sound,Light and Modern physics)	03
1. Determination of Young's Modulus 'Y' of a bar bybending.	03
2. Determination of modulus of rigidity 'η' of wire by Maxwell'sneedle.	03
3. Determination of resolving power ofprism.	03
4. Determination of wave length of sodium source byBiprism.	03
5. To determine Cauchy's constant.	03
6. Determination of Thermal conductivity of rubber tube.	03
7. Determination of focal length of an optical system by means ofGoniometer.(Searle's Method)	03
8. Determination of value of e/m by Thompson'smethod.	03
9. To study solar cell characteristics.	03
10. Absorption co efficient of liquid using Photo voltanic cell.	03
11. To determine the band gap in a semiconductor using a P N junction diode.	
SECTION B (Electricity, Magnetism and Electronics)	
1. Determination of current sensitivity of Ballistic Galvanometer.	03
2. Determination of capacity ratio by Desauty's bridge using Ballistic Galvanometer.	03
3. Determination of thermo EMF of thermo couple.	03
4. To convert a galvanometer in to an ammeter of a given range.	03
5. To determine the self inductance of a given coil by Maxwell's induction bridge.	03
6. Determination of resistance of unit length of potentiometer wire and to find specific resistance of coil by Carey-Foster method.	03
7. To study a transformer: Determination of Parameters oftransformer.	03
8. Determination of inductance of coil by Hartley Oscillator and calibration of variable air capacitor.	03
9. To study frequency response of RC Amplifier .	03
10. Determination of Q-factor of parallel resonance(LCR).	

TEXT BOOKS RECOMMENDED FOR PAPER PHY-CC-305

1) Advanced practical physics by Chauhan AndSingh
2) B.Sc.Practical Physics by C L Arora
3) Practical Physics by Kumar and Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

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CHOICE BASED PATTERN

SEMESTER PATTERN

Credit and semester System Syllabus

B.Sc.(PHYSICS) SEMESTER-IV

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practical is allotted on Semester pattern.
- There shall be **02 Theory papers 70 marks each** of 2:30 Hours duration. [70+30 marks Internal =100marks]
- Physics Practical Examination shall be of 10**0 marks** of 06 **hours duration** in UniversityExamination.
- There shall be **Two Semesters** in an academic Year. (Semester-3 & 4)

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT*= TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDITS
1	**PHY CC- 403**	THEORY	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
2	**PHY CC-404**	THEORY	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
3	**PHY CC- 405**	PRACTICAL	100	40	15 WEEKS X 9 HOURS =135	06	06

INTERNAL MARKS : 30

INTERNAL EVALUATION :

Test	:	15 Marks
Assignment/Presentation	:	10 Marks
Seminar/Attendance	:	05 Marks
Total	:	30 Marks

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-IV

PAPER-CC-403: Quantum mechanics , Solid State Physics , Sound and Optics-2, Nuclear Physics

Credits: **04**

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Quantum Mechanics** ➢ Group velocity and Phase velocity ➢ Schrodinger wave equation for a free particle subjected to a forcein one dimension and three dimensions ➢ Operator correspondence for different dynamic variables ➢ Physical interpretation of the wave function ➢ Probability interpretation of the wave function ➢ Normalization of wave function ➢ Conservation ofprobability ➢ Eigen value and Eigen function ➢ Particle in a box ➢ Finite Potential wall problem ➢ Examples	15	18
2	**Solid State Physics** ➢ Introduction to Inter atomic forces in solids ➢ Force between atoms ➢ Different types of Bonds in solids ➢ Cohesion of atoms and cohesive energy ➢ Calculation of cohesive energy ➢ Calculation of Madelung constant of Ionic crystal ➢ Construction of ReciprocalLattice ➢ Miller Indices ➢ Relation between crystal axes(a b c) and primitive vectorsof reciprocal lattice ($a^* b^* c^*$) ➢ Brilliourn zone ➢ Laue's interpretation of X-Ray Diffraction byCrystal ➢ Crystal defects and its classification ➢ Examples	15	18

3	**Sound and Optics-2** ➢ Doppler effect for different cases ➢ Limitation of Doppler'sprinciple ➢ Architectural Acoustics ➢ Loudness, Reverberation (Sabine's formula) ➢ Determination of absorption coefficients ➢ Method of Design for Good Acoustics ➢ Properties of Ultrasound ➢ Production of ultrasonic wave : (1) Magnetostriction generator (2) Piezo-electric generator ➢ Detection of Ultrasonic waves (1) Piezo-electric detector (2) Kunt's tube method (3) Sensitive flame method (4) Thermal detector method ➢ Methods for Ultrasonic Velocity Measurement(Ultrasonic Interferometer) ➢ Uses of ultrasonic (Physical, Medical & Navigation) ➢ Production of linearly polarized light by Reflection : Brewster's Law ➢ Polarizer and Analyzer : Nicol Prism ➢ Effect of polarizer on natural light ➢ Effect of analyzer on Polarized light : Malus Law ➢ Explanation of Calcite Crystal ➢ Positive crystals and Negative crystals ➢ Phase difference between e-Ray and o-Ray ➢ Quarter wave plate ➢ Half wave plate ➢ Examples	15	17
4	**Nuclear Physics** ➢ α - Decay : (1)Properties of Alpha Particles (2) Alpha Spectrum (3) Range of Alpha-Particles (4) Geiger-Nuttal Law (5) Barrier Penetration (6) Gamow Theory of Alpha Decay(with derivation) ➢ Determination of velocity and energy of α – particleusing magnetic spectrograph ➢ $\beta - Decay$:(1) Introduction (2) Continuous β – Ray spectrum (3)Anomalies of continuous β – particle spectrum (4) Pauli's Neutrino hypothesis ➢ Brief introduction of Nuclear Models ➢ Examples	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Quantum mechanics , Solid State Physics , Sound , Nuclear Physics and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY-CC-403

1. Quantum Mechanics by Ahuti Narayan Konark
2. Quantum Mechanics by Shrivastava
3. Elements of solid state physics by J. P. Shrivastava
4. Solid State Physics by S. O. Pillai
5. Solid State Physics by C. Kittle
6. A Text book of sound by R. L. Saihgal (S. Chand)
7. A Text book of sound by M. Ghosh (S. Chand)
8. Principles of Optics by B. K. Mathur
9. A textbook of optics by Dr. N. Subrahmanyam & Brij Lal
10. Optics by Singh & Agarwal
11. Nuclear Physics by S. B. Patel
12. Nuclear Physics by Pandya and Yadav
13. Introduction to Nuclear and Particle Physics by V.K. Mittal , R.C.Verma and S.C.Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-IV

PAPER-CC-404: Mathematical physics-2, Magnetism, Electrodynamics, Electronics-2, Spectroscopy-2

Credits: 04

Marks: **100 Marks**

Semester End Examination of: **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Mathematical Physics-2 Fourier Series** ➢ Definition of Fourier series ➢ Dirichlet's conditions for Fourier series ➢ Evaluation of coefficient of Fourier series ➢ Graphical Representation of a Function ➢ Cosine & Sine series(Even and Odd function) ➢ Change of interval in Fourier series ➢ Complex representation of Fourier series ➢ Advantages of Fourier series ➢ Physical Application of Fourier series : (1) Square wave (2) Full wave rectifier (3) A saw-tooth wave (4) A triangular wave **Differentiation of Vector** ➢ Formulae of Differentiation of Vector ➢ Gradient of a Scalar field ➢ Divergence of a Vector field ➢ Curl of a Vector field ➢ Examples	15	18
2	**Magnetism and Spectroscopy-2** ➢ Measurement of magnetic dipole moment by deflection magnetometer ➢ Ratio of two magnets by vibrational magnetometer ➢ Measurement of Susceptibility : (1) Rowland method (2)Magnetometer method (3) Curie Balance method ➢ Hysteresis Loss : (1) For I→H curve (2) For B → H curve ➢ Langevin's theory for paramagnetic substances ➢ Curie Weiss law for ferromagnetic substance ➢ Magnetic Circuit of an electromagnet ➢ Experimental study of Zeeman effect ➢ Classical interpretation of normal Zeeman effect ➢ Experimental study of Raman effect ➢ Classical interpretation of Raman effect ➢ Experimental arrangements and results of stark effect ➢ Examples	15	18

3	**Electrodynamics** ➢ Faraday's Law of Induction and Lenz's law ➢ Induced Electric Field in terms of the Vector Potential ➢ Electromotive Force in a system moving in a time varying Magnetic field ➢ Self Inductance ➢ Mutual Inductance ➢ Equation of Continuity ➢ Concept of displacement current ➢ Derivation of Maxwell equation (in differential & integral form) ➢ Physical Interpretation of Maxwell's equation ➢ Maxwell equation in free space ➢ Linear Isotropic Media and Harmonically Varying Fields ➢ Poynting theorem ➢ Examples	15	17
4	**Electronics-2** ➢ Zener diode: (1) Construction and working (2) Zener diode asvoltage regulator ➢ Unijuction Transistor (UJT) : (1) Construction and working (2) Characteristics and application of UJT ➢ Silicon Controlled Rectifier (SCR) : (1) Construction and working (2) Transistor equivalent circuit of SCR (3) Characteristics and application of SCR ➢ Field Effect Transistor(FET) : (1) Construction and working (2) Characteristics and salient features of FET (3) Relation between FET parameters ➢ MOSFET : (1) Depletion type MOSFET (2) Enhancement type MOSFET ➢ Examples	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Mathematical physics, Magnetism ,Electrodynamics, Spectroscopy and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY-CC-404

1. Mathematical Physics by P. K. Chatopadhyay (Wiley Eastern Limited)
2. Mathematical Physics by S. Chand
3. Mathematical Physics by Mary Bose
4. Mathematical Physics by Rajput
5. Fundamental of Magnetism & Electricity by D. N. Vasudeva (S. Chand & Comm.)
6. Electricity and Magnetism by R. Murugeshan (S. Chand)
7. Principle of Electronics by V. K. Mehta and Rohit Mehta
8. Hand Book of Electronics by Gupta and Kumar (Prgati Prakashan)
9. Electrodynamics by S. L. Gupta & V. Kumar (S. P. Sinsh, Pragati Prakashan)
10. Introduction to Electrodynamics by D. J. Griffith
11. Elements of spectroscope by Gupta, Kumar and Sharma
12. Molecular Spectroscope by G. King

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-IV

PHY-CC-405: PRACTICAL (Based on paper P- 403 & 404)

Credits: **06**

Marks: Semester End Examination: **100 Marks**

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

Detailed Syllabus for Physics practical	Teaching Hours
SECTION A(General Physics: Heat , Sound, Light and Modern Physics)	
1. Determination of surface tension of mercury by Quinck's method.	03
2. Verification of Stefan's law of radiation.	03
3. Determination of Young's Modulus 'Y' of a bar by elevation.	03
4. Determination of Modulus of rigidity 'η' of rod by Searle's statical method	03
5. Determination of Viscosity of liquid by co-axial cylinder.	03
6. Determination of resolving power of grating.	03
7. Determination of wavelength of Sodium source by cylindrical edge . 8.To determine e/m of an electron by magnetic focusing method. 9.Determination of Plank's constant 'h' by Photo cell.	03 03 03
Detailed Syllabus for Physics practical	**Teaching Hours**
SECTION B(Electricity and Magnetism and Electronics)	
1. Determination of High resistance & leakage resistance by Ballistic Galvanometer.	03
2. Determination of low resistance by Potentiometer.	03
3. Determine Ballistic constant and resistance of Ballistic Galvanometer.	03
4. Determination of capacity ratio by method of Mixture.	03
5. Determination of unknown frequency of audio-frequency oscillator by Wein's bridge.	03
6. To convert a galvanometer in to a voltmeter of a given range.	03
7. To determine absolute value of capacitor using Ballistic Galvanometer.	03
8. To study voltage – regulation characteristics of Zener diode.	03
9. To study characteristics of FET .	03
10. To study Dynamic characteristics of transistor and find quiescent point.	03
11. Determination of inductance of coil by Colpitt's oscillator.	03
12. To study voltage multiplier (Doubter-half wave & full wave, Triplex and Quadruplet)	03

TEXT BOOKS RECOMMENDED FOR PAPER PHY-CC-405

1) Advanced practical physics by Chauhan And Singh
2) B.Sc. Practical Physics by C L Arora
3) Practical Physics by Kumar and Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER – V

SEMESTER PATTERN

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practicals is allotted on Semester pattern.
- There shall be **04 Theory papers 70 marks each** 04 Hours of Teaching .
- [70+30 marks Internal =100marks]
- Physics Practical Examination shall be of 200 **marks** of 12 **hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-5 & 6)

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT* = TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDITS
1	Elective cource SEC-501	Astronomy & Astrophysics	70+30	28+12=40	15 WEEKS X 03 HOURS =45	2:30	03
2	Core cource CC-503	Classical Mechanics, Mathematical Physics, Thermal Properties of Solids	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
3	Core cource CC-504	Electrostatics, Magnetostatic , Laser and Solid State Physics , Atomic Physics	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
4	Core cource CC-505	Digital Electronics , „C Programming	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
5	Core cource CC-506	Power Electronics , Opto Electronics , Solar Physics	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
6	Practical CC-507	Practicals	200	80	15 WEEKS × 12 HOURS= 180	12	12

INTERNAL EVALUATION:

TEST	15 Marks
ASSIGNMENT/PRESENTATION:	10 Marks
SEMINAR/ATTENDANCE	05 Marks
TOTAL	**30 Marks**

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-V

PAPER-SEC-501: Astronomy & Astrophysics

Credits: 03

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Astronomical Scales** ➢ Astronomical Distance-Mass and Time ➢ Scales, Brightness ➢ Radiant Flux and Luminosity ➢ Measurement of Astronomical Quantities Astronomical Distances ➢ Stellar Radii ➢ Masses of Stars ➢ Stellar Temperature	11	18
2	**Basic concepts of positional astronomy** ➢ Basic Parameters of Stars: Determination of Distance by Parallax Method ,Brightness, Radiant Flux and Luminosity ➢ Apparent and Absolute magnitude scale ➢ Distance Modulus ➢ Determination of Temperature and Radius of a star ➢ Determination of Masses from Binary orbits ➢ Stellar Spectral Classification	11	18
3	**Stellar spectra and classification** ➢ Structure ; Atomic Spectra Revisited ➢ Stellar Spectra ➢ Spectral Types and Their Temperature Dependence ➢ Black Body Approximation ➢ HertzsprungRussell Diagram, Luminosity Classification) **The sun** ➢ Solar Parameters ; Solar Photosphere, Solar Atmosphere, Chromosphere. Corona, Solar Activity, Basics of Solar Magneto- hydrodynamics. Helioseismology	11	17
4	**The solar family and The milky way** ➢ Solar System: Facts and Figures ➢ Origin of the Solar System: The Nebular Model ➢ Tidal Forces and Planetary Rings ➢ Extra-Solar Planets	12	17

	➢ Basic Structure and Properties of the Milky Way ➢ Nature of Rotation of the Milky Way • Differential Rotation of the Galaxy and Oort Constant • Rotation Curve of the Galaxy and the Dark Matter • Nature of the Spiral Arms ➢ Stars and Star Clusters of the Milky Way		

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Astronomy, Astrophysics and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-501

1. Modern Astrophysics by B.W. Carroll & D.A. Ostlie, Addison-Wesley Publishing Co.
2. Introductory Astronomy and Astrophysics by M. Zeilik and S.A. Gregory, th Edition, Saunders College Publishing.
3. The physical universe: An introduction to astronomy by F.Shu, Mill Valley: University Science Books.
4. Astronomy : The evolving universe by Michel Zeilik – Harper & Row -publishers
5. Fundamental of Astronomy (Fourth Edition) by H. Karttunen et al. Springer, K.S. Krishnasamy An introduction to Astro physics", Second printing, Prentice Hall of India
6. Foundations of Astronomy by Michael A. Seeds- Brooks Publication

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-V

PAPER-CC-503: Classical Mechanics, Mathematical Physics, Thermal Properties of Solids

Credits: 04

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Lagrangian Formulation and applications** ➢ Constraints ➢ Generalized Co ordinates ➢ D□Alembert□s Principle ➢ Lagrangian Equations ➢ Importance of Langrangian function ➢ A general expression for kinetic energy ➢ Symmetries and laws of conservation ➢ Cyclic co-ordinates ➢ Velocity dependent potential ➢ Rayleigh□s dissipation function ➢ Motion of a particle using Cartesian co-ordinates ➢ Motion of a particle using polar co-ordinates ➢ Equation of motion of one dimension harmonic oscillator ➢ Atwood□s machine ➢ Simple pendulum with moving support ➢ Examples	15	18
Unit-2	**Variational Principle and applications** ➢ Configuration Space ➢ Some techniques of Calculus of variation ➢ Hamilton□s Principle ➢ Equivalence of Lagrangian, Newtonian and Hamiltonian formulation ➢ Advantages of the lagrangian formulation ➢ Lagrange□s undetermined multipliers and its application. ➢ Hamilton□s Equations of motion ➢ Phase space ➢ Brachistochrome problem ➢ Geodesic ➢ Spherical pendulum ➢ Charged particle in an electromagnetic field ➢ Examples	15	18

Unit 3	**Differential Equations** ➢ Some partial differential equations in Physics ➢ The method of separation of variables ➢ Separation of Helm Holtz equation in Cartesian coordinate system ➢ Separation of Helm Holtz equation in Spherical polar coordinate system ➢ Laplacian equation in Cartesian coordinate system ➢ Laplacian equation in Spherical polar coordinate system	15	17
Unit 4	**Thermal Properties of Solids** ▯ Introduction ▯ Classical Lattice Heat Capacity ▯ Einstein Model ▯ Debye Continuum Model ▯ problems	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Classical Mechanics, Mathematical Physics, Thermal Properties of Solids and their applications

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-503

1. Text Book : Introduction to classical mechanics - R G Takwale & Puranik. Pub: Tata McGraw Hill
2. Text Book : Mathematical Physics - P.K. Chatopadhyay. (Wiley Eastern Limited)
3. Classical mechanics - Rana & Jog
4. Classical mechanics - A.B.Bhatia
5. Mathematical Methods in Physical Sciences – M.L.Bose
6. Mathematical Physics – B.S.Rajput
7. Classical Mechanics by Gupta, Kumar and Sharma
8. Solid state physics by R L Singhal
9. Solid state Physics by S O Pillai
10. Solid State physics by J P Shrivastav
11. Solid State Physics by C Kittle

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-V

PAPER-CC-504: Electrostatics, Magnetostatic , Laser and Solid State Physics , Atomic Physics

Credits: 04

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Electrostatics** ➢ Di-electric Polarization. ➢ Relative permittivity. ➢ Relation between **D, E** and **P**. ➢ Point charge in Di-electric fluid. ➢ Potential and field due to polarized sphere. - At external and internal point. ➢ Di-electric sphere is placed in uniform electrostatic field : - Resultant field inside and outside the Di-electric sphere. ➢ Molecular field in a Di- electric (Claussius- Mossotti Relation) - Validity of Claussius- Mossotti Relation. ➢ Examples	15	17
Unit 2	**Magnetostatic** ➢ Current density ➢ Magnetic Induction ➢ Force on a current element (Ampere□s force law). -Application of Ampere□s law ➢ Biot- Savert□s law (Magnetic induction). -Application of Biot-Savert□s law ➢ Divergence of magnetic induction B. ➢ The magnetic vector potential A. ➢ The Lorentz condition. ➢ The curl of magnetic induction B. ➢ Magnetic scalar potential. ➢ Examples	15	18

Unit 3	**Laser and Lattice Vibrations** - Absorption, Spontaneous emission, stimulated emission. - LASER principle and population inversion. - Einstein A and B co-efficient. - LASER: Ruby LASER, He-Ne LASER, Semiconductor LASER. - Holography. - Principle of Holography - Characteristic of holograph - Practical Application of Holography. - Difference between Photography & Holography. - Applications of LASER. - **Lattice Vibrations :** Introduction - The „Balls and Springs Model of Harmonic Crystal - Normal Modes of a One-dimensional Monatomic Chain (i)The Periodic Boundary Condition (ii)Salient Features of the Dispersion Curve - Normal Modes of One-dimensional Diatomic Chain (i) Salient Features of the Dispersion Curves: Acoustic Branch, Optical Branch (ii) The Reststrahlen Band - Quantization of Lattice Vibrations	15	18
Unit 4	**Atomic Physics (Zeeman Effect ,Paschen – Back Effect , Stark Effect) I. Magneto Optical Effect of an Atom** ➢ Introduction ➢ The Magnetic Moment of the Atom ➢ Gyro magnetic Effect : Interaction of Atom with external Magnetic Field ➢ Vector Atom Model and Normal Zeeman Effect ➢ Vector Atom Model and Anomalous Zeeman Effect ➢ Selection Rule , Term and Term Multiplicity ➢ Vector Atom Model and Paschen-Back Effect **Testing the Validity of Zeeman Theory :** ➢ Analysis of the Normal and the Anomalous Pattern of some Concrete Lines such as the D lines of Sodium , the Green (5461 Å)and Violet (4358 Å lines of Mercury. **Lande's g factor** ➢ Experimental verification Lande s g factor ➢ Atomic spectra by W White	15	18

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Electrostatics, Solid State Physics ,Atomic Physics and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-504

1. Electrodynamics by Gupta, Kumar & Singh
2. Introduction to Electrodynamics by Griffith.
3. Principles of optics by Dr. N. Subramayam, Brijlal.
4. Introduction to LASER by Tyagrajan
5. Solid state physics by R L Singhal
6. Solid state physics by J P Shrivastav
7. Atomic Physics by J B Rajam
8. Elements of spectroscopy by Kumar, Gupta and Sharma

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-V

PAPER-CC-505: Digital Electronics , „C Programming

Credits: 04

Marks: **100 Marks**
Semester End Examination of : **70Marks**
Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Digital – I and II** ➢ Logic fundamental ➢ Logic gates(Circuit and operation) ➢ AND gate: diode and transistor circuit ➢ OR gate: diode and transistor circuit ➢ NOT gate transistor circuit ➢ NAND gate: DTL and TTL ➢ NOR gate DTL: and TTL ➢ Laws of Boolean algebra ➢ Reducing Boolean expression with problems ➢ Logic circuits : Using AND,OR and NOT gates ➢ Universal gates: NOR and NAND gates ➢ Logic circuit using NOR and NAND gates ➢ Half adder ➢ Full adder	15	18
2	**Combinational logic** ➢ Min terms ➢ Truth tables and maps Two variables Three variables Four variables ➢ Solving digital problems using maps Sum of products(SOP) map reduction Product of sums(POS) map reduction	15	18
3	**'C' Programming - I** ➢ Introduction to computer ➢ Numeric constant i. Constants ii. Scalar variables iii. Declaring variable names iv. Defining constant ➢ Arithmetic Expressions i. Arithmetic operators and modes of expressions	15	17

	ii. Integer expression iii. Floating point expression iv. Operator precedence in expression v. Assignment statements vi. Defining variables vii. Arithmetic conversion viii. Assignment expression ix. Increment decrement statement x. Multiple assignment		
4	**'C' Programming - II** Input output statements Conditional statements Implementing loops in programs i. The while loop ii. The for loop iii. The do while loop ➢ Flow Chart and algorithm ➢ Some simple program in „C	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Digital Electronics , „C Programming and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-505

1. Digital electronics by William Gothmann
2. Digital electronics by Gaonkar
3. Digital electronics by Malvino
4. Programming in C by V Rajaraman
5. Programming in C by Balaguruswamy

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-V

PAPER-CC-506: Power Electronics ,Opto Electronics , Solar Physics

Credits: 04

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Power Amplifiers** ➢ Introduction ➢ Series-fed class –A amplifier with analysis ➢ Transformer coupled class-A amplifier with analysis ➢ Class –B amplifier with analysis ➢ Class – A push pull amplifier (only description) ➢ Class – B push pull amplifier (onlydescription) ➢ Examples	15	18
2	**Amplitude Modulation** ➢ Definitions ➢ Amplitude modulation ➢ Methods of amplitude modulation (i) linear modulation :(a) collector modulation (b)Base modulation (c) Emitter modulation (d) FET drain modulation (ii) Square law modulation : (a) FET square law modulation (b) balanced modulator ➢ Examples	15	18
3	**Opto Electronics** ▯ Electromagnetic spectrum ▯ Spectral response of human eye ▯ Comparison with tungsten lamp spectra ▯ Illumination and irradiance ▯ Photoconductive Sensors – Light dependent resistor (LDR) – Photodiode- PIN diode – Phototransistors ▯ Photovoltaic sensor- solar cell	15	17

4	**Solar Physics and Power supplies and Regulation** Piranometer – the solar energy measuring equipment Flat Plate solar collectors and its examples Solar Pond – Principle , operation, types of solar ponds **Power supplies and Regulation** Introduction Unregulated and regulated power supply (only explanation) Zener diode as voltage regulator Transistor voltage regulation – series voltage regulation or series regulator circuit, improved series regulator –	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Power Electronics, Solar Physics and their applications

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-506

- Hand book of Electronics By Gupta and Kumar – Pragati prakashan(Thirty Nineth Edition)
- Electronic devices and circuit theory By Boylestad and Nashelsky (Tenth Edition) – Pearson(Prentice Hall)
- Physics of semiconductor Devices By S.M.Sze
- Electronic device and circuits By Allen Motershed- PHI
- Solar Physics By G.D.Rai

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-V

PHY-CC-507: PRACTICAL (Based on paper P- 503 to 506)

Credits: 12

Marks: Semester End Examination: **200 Marks**

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper P- 503 to 506]

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

There shall be Local Excursion and Study tour in any part of India for the subjective study. It may include visit to Scientific Research laboratories, Observatories, R & D Departments of Industries and government institutions etc. Students shall have to submit field report/Tour report in their Journal .

Design of the practical setup should be such that student can develop their skill of connection of discrete components.

Detailed Syllabus for Physics practical	Teaching Hours
SECTION - A (GENERAL PHYSICS AND HEAT):	
1. To determine "g " by Kater□s pendulum (Variation of Length).	03
2. To determine "Y" by Koening□s method.	03
3. To determine "Y" of a rod by Newton□s rings.	03
4. To determine Stefan□s Constant σ.	03
5. To study variation of surface tension with temperature by Denou□s method.	03
6. To determine viscosity of liquid by log decrement method.	03
SECTION – B LIGHT AND MODERN PHYSICS	
1. To determine the wavelength of Sodium light using Lloyd□s mirror.	03
2. To study the elliptical polarization of light.	03
3. To determine refractive index of liquid by method of total internal reflection.	03
4. To determine the separation between the plates of Febry-Perot etalon..	03
5. To determine the band gap energy of semiconductor.	03
6. To determine magnetic sensitivity of cathode ray tube.	03
7. To determine the value of Rydberg□s constant.	03
8. To study the absorption spectra of KMnO4 solution by spectrometer.	03
9. The platue of GM tube.	03
SECTION - C (ELECTRICITY AND MAGNETISM)	
1. To study charge and discharge of capacitor using Neon lamp.	03
2. To study L-C-R series circuit.	03
3. To obtain hysteresis curve for given material by magnetometer method.	03
4. To determine the self inductance of a given coil by Owen□s bridge.	03

5. To determine current sensitivity, charge sensitivity and total criticaldamping resistance of Ballistic Galvanometer.	03
SECTION – D (ELECTRONICS)	
1. To study frequency response curve of negative feedbackamplifier	03
2. To study phase shift oscillator.	03
3. To determine the h parameter oftransistor.	03
4. To study the characteristics of UJT and relaxation oscillator	03
5. To study a.c.load line for a given transistor.	03
6. To study operational amplifier as square wave generator.	03

TEXT BOOKS RECOMMENDED FOR PAPER P-507

1) Advanced practical physics by Chauhan And Singh
2) B.Sc.Practical Physics by C L Arora
3) Practical Physics by Kumar and Gupta

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER – VI

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT* = TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDITS
	Elective course EC- 601	Material Science	70+30=100	28+12=40	15 WEEKS X 03 HOURS =45	2:30	03
2	Core cource CC-603	Quantum Mechanics, Mathematical and Nuclear Physics	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
2	Core cource CC-604	Electromagnetic Theory, Fiber Optics and Solid State Physics, X-Ray	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
3	Core cource CC-605	OP-AMP, Solid state Electronics, Superconduct-ivity	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
4	Core cource CC-606	Electronics and Communication	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2:30	04
5	Practical CC-607	Practical	200	80	15 WEEKS × 12 HOURS= 180	12	12

INTERNAL EVALUATION:

TEST	15 Marks
ASSIGNMENT/PRESENTATION:	10 Marks
SEMINAR/ATTENDANCE	05 Marks
TOTAL	**30 Marks**

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-VI

PAPER-SEC-601 : Material Science

Credits: 03

Mark: **100 Marks**
Marks: **Semester end University Examination: 70 Marks**
Continuous Internal evaluation: 30

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Introduction and Imperfections in solids** ➢ What is material science?, ➢ classification of material-metals ,ceramics ➢ Polymers , composites , smart materials, advanced materials. ➢ Point defects ➢ Vacancies and self interstitial, ➢ Substitutional impurities ➢ Atomic point defect, Shottky defect, frenkel defect, dislocation-ege and screw location, ➢ Bergers vector ➢ Interfacial defects-external – surface ➢ Grain boundaries ➢ Twin boundaries ➢ Stacking faults ➢ Bulk and volume defects	12	18
2	**Diffusion in solids** ➢ Introduction ➢ Diffusion mechanism ➢ Vacancy diffusion ➢ Interstitial diffusion ➢ Steady state diffusion and Non-steady state diffusion ➢ Fick's laws ➢ Factors that influence diffusion- temperature ➢ Diffusion species ➢ Example of aluminium for IC interconnects ➢ Diffusion in ionic and polymeric materials	11	17
3	**Ceramics and its properties** ➢ Glasses ➢ Glass ceramics ➢ Refractories – fire clay and silica refractories ➢ Abrasives	11	18

	➢ Cements ➢ Advanced ceramics- optical fibers ➢ Ceramic ball bearings ➢ Piezo electric ceramics ➢ Stress – strain behavior of ceramics ➢ Flexural strength and elastic behavior **Polymers and its properties** ➢ Different forms of Carbon-Diamond ➢ Graphite ➢ Fullerenes ➢ Carbon nano tubes ➢ Hydro carbon molecules ➢ Polymer molecules ➢ Homo polymers and copolymers ➢ Molecular weight calculation ➢ Linear polymers ➢ Branched polymers ➢ Cross linked polymers ➢ Network polymers ➢ Thermo setting and thermo plastic polymers ➢ Stress – strain behavior and viscoelastic deformation ofpolymers		
4	**Material Analysis Techniques** ➢ Single crystal and powder diffraction techniques with diffractometer ➢ Laue's technique and rotating crystal method ➢ Microscopic techniques-Optical microscopy ➢ Electron microscopy ➢ Transmission electron microscopy ➢ Scanning electron microscopy ➢ Scanning probe microscopy ➢ Construction and working of each device ➢ Grain size determination technique	11	17

Course Outcome- Learner will able to learn the basic conceptual and theoretical aspects of Material Science and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY-SEC-601

1. Material Science and Engineering by William D. Callister
2. Materials science and engineering byRaghavan
3. Material science by S.L.Kakani & Amit Kakani
4. Material science & Engineering R.K.Rajput
5. Material Science and Engineering I.P.Singh & Subhash Chander

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER- VI

PAPER-CC-603: Quantum Mechanics, Mathematical Physics, Nuclear

Credits: 04

Marks: **100 Marks**
Semester End Examination of: **70Marks**
Continous Internal Evaluation: **30 Marks**

Unit	Detailed syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Stationary states, Exactly soluble Eigenvalue Problems** ➢ Admissible conditions on the wave functions ➢ Ehrenfest's theorem and expectation values ➢ The time independent Schrodinger Equation ➢ The fundamental Postulates of wave mechanics ➢ The Schrodinger Equation for simple harmonic Oscillator in one dimension and it's Eigen function and Eigen values ➢ The Abstract Operator method – Problem ➢ Ortho normal and Ortho gonal Eigen function ➢ Schmidt Orthogonalisation process ➢ Few related theorems (I & II)	15	18
Unit-2	**Operators and Differential equations** Types of operators Algebra of operators Linear operator Vector operator Laplancian Operator in Cartesian co-ordinate system Laplancian Operator in spherical co-ordinate system commutator of operators Self Adjoint operator Unitary operator Angular momentum operator Analytic function Ordinary and singular points Series solution around an ordinary point problems Gamma Function Kroneker Delta Function and Dirac Delta function	15	18

Unit 3	**Nuclear Physics** **The Liquid Drop Model of a Nucleus** ➢ Introduction Binding Energies of Nuclei : Plot of B/A versus A ➢ Weizsacher's Semi Empirical Binding Energy – Mass formula ➢ Mass Parabolas: Prediction of Stability Against β decay for Members of an Isobaric family **The Shell Model of a Nucleus** ➢ Introduction ➢ The Evidence that Led to the Shell Model ➢ Main Assumptions of the Single-Particle Shell Model ➢ Concept of Spin-Orbit Coupling of an Electron bound in an Atom ➢ Spin-Orbit Coupling in Nuclei ➢ Predictions of the Shell Model ➢ The Collective Model of a Nucleus	15	17
Unit-4	**Introduction to Elementary Particles** ▯ Introduction ▯ Fundamental Interactions -Nucleon Forces ▯ Families of Elementary Particles ▯ Observed Interactions and Conservation Lows **Nuclear Instrumentation** **Nuclear Magnetic Resonance (NMR)** ▯ Introduction ▯ The Technique of NMR(Nuclear Magnetic Resonance) ▯ Applications of NMR in Physics ▯ Applications of NMR in Chemistry **Mossbauer Spectroscopy** ▯ Introduction ▯ The Mossbauer Effect ▯ Applications of Mossbauer Effect	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Quantum Mechanics, Mathematical Physics, Nuclear and their applications

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-603

1) Text Book : Quantum mechanics - Ahutinarayan Konar Pub: The Dacca Students' Library, Calcutta
2) Text Book : Mathematical Physics - P.K. Chatopadhyay.- Wiley Eastern Limited
3) Mathematical Methods in Physical Sciences – M.L.Bose
4) Mathematical Physics – B. S. Rajput
5) Nuclear Physics by S. B. Patel
6) Nuclear Physics by Pandya and Yadav
7) Modern Physics By Jermy Bernstein , Paul M. Fishbane and Stephen Gasiorowicz (Pearson Publication)
8) Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles by Robert Eisberg and Robert Resnick

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)

SEMESTER-VI

PAPER-CC-604: Electromagnetic Theory, Fiber Optics , Solid State Physics, X-Ray

Credits: 04

Marks: **100 Marks**

Semester End Examination of : **70Marks**

Continous Internal Evaluation: **30 Marks**

Unit	Detailed syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Maxwell's Equation (Propagation of EM waves in media)** ➢ Maxwell's equation (without derivation) Differential and integral form, in free space and in Linear isotropic media. ➢ Propagation of EM waves in , a. Free space b. Non-conducting media c. conducting media ➢ Boundary conditions for the electromagnetic field vectors: * E,D,H & B (At the interface between two media).	15	17
Unit-2	**Fiber Optics:** ➢ Introduction. ➢ Principle of light transmission in a fiber. ➢ Effect of index profile on propagation. ➢ Modes of Propagation. ➢ Losses in fiber. ➢ Dispersion. ➢ Characteristic of fiber. ➢ Merits and Applications of fiber.	15	17
Unit 3	**Free Electron Theory of Metals and Band Theory of Solids** **I.Free Electron Theory of Metals** ➢ Introduction ➢ The Drude Model (i) DC Electrical Conductivity of Metals (ii)Thermal Conductivity of Metals ➢ Lorentz Modification of the Drude Model ➢ Fermi-Dirac Distribution Function ➢ The Sommerfield Model (i) The Density of States	15	18

	(ii) The Free Electron Gas at 0 K (iii) Energy of Electron Gas at 0K ➢ The Electron Heat Capacity ➢ The Sommerfield Theory of Electric Conduction in Metals		
	Band Theory of Solids ➢ Introduction ➢ Consequences of Periodicity ➢ Proof of the Bloch Theorem ➢ The Periodicity of the Bloch Functions and Their Eigen values The Kronig-Penney Model		
Unit-4	**X-RAY** ➢ X-Ray scattering:- i. Coherent scattering. ii. Incoherent scattering. ➢ Continuous x-ray spectrum:- i. Characteristic Emission spectrum. ii. Characteristic Absorption spectrum. ➢ Explanation of emission and absorption spectra. ➢ Comparison of optical and X-rayspectra. ➢ Mosely's law. ➢ Auger effect. ➢ Applications of X-Ray. ➢ Examples	15	18

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Electromagnetic Theory, Fiber Optics , Solid State Physics and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-604

1. Electrodynamics by Gupta, Kumar & Singh
2. Introduction to Electrodynamics by Griffith.
3. Principles of optics by Dr. N. Subramayam, Brijlal.
4. Communication electronics by Rody & Coolin
5. Element of spectroscopy by Gupta, Kumar & Sharma
6. Solid State Physics by R.L.Singhal
7. Elements of Solid State Physics by J.P.Shrivastav
8. Solid State Physics by S.O.Pellai

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-VI

PAPER-CC-605: OP-AMP, Solid State Electronics, Superconductivity

Credits: 04

Marks: **100 Marks**
Semester End Examination of : **70Marks**
Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**OP-AMP - I** ➢ Introduction to op-amp ➢ Definition and block diagram of op-amp ➢ Schematic symbol and Ideal voltage transfer curve ➢ Different parameters of op-amp ➢ Equivalent circuit of an OP-AMP ➢ Open loop configuration : Inverting amplifier ,Non inverting amplifier, Differential amplifier, block diagram representation of feedback configuration	15	18
2	**OP-AMP -II** ➢ Close loop configuration i. Inverting amplifier • Voltage gain with feedback • Input resistance with feed back • Output resistance with feedback ii. Non inverting amplifier iii. Differential amplifier ➢ Summing amplifier i. inverting configuration ii. Non inverting configuration ➢ Difference amplifier i. inverting configuration ii. Non inverting configuration Integrator ➢ Differentiator ➢ I-V converter ➢ V-I converter	15	18
3	**Solid state devices and Digital flip-flops** ➢ DIAC : Construction – operation – characteristics-application ➢ TRIAC: Construction-operation -characteristics – application	15	17

	➢ LED : Operation- application, Photo diode ➢ IC : Classification - making of monolithic IC ➢ The diode as an ac switch ➢ The bipolar transistor as a ac and dc switch ➢ Memory elements-flip-flops- Introduction ➢ R-S flip-flop		
	➢ NAND and NOR latches ➢ Gated flip-flop ➢ Clocked R-S flip-flop ➢ Clocked D flip-flop ➢ Edge triggered R –S flip-flop ➢ Edge triggered D flip-flop ➢ Edge triggered J-K flip-flop		
4	Superconductivity Phenomena Without Observable Quantization Zero resistance and Persistent Current Perfect Diamagnetism: Meissner Effect F-H London Equations Critical Field : Type I and Type II superconductors Isotope Effect BCS Theory : A Qualitative Approach (i) Cooper Pair formation (ii) BCS Ground state Coherence Length High Temperature Superconductors (HTS)	15	17

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of OP-AMP, Solid state Electronics, Superconductivity and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-605

1. Digital electronics by William Gothmann
2. Digital Electronics by A. Anand
3. Operational amplifier and linear integrated circuit by Ramakant A Gayakwad
4. Solid State Physics By S.O.Pillei
5. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles by Robert Eisberg and Robert Resnick

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-VI

PAPER-CC-606 : Electronics and Communication

Credits: 04

Marks: **100 Marks**
Semester End Examination of : **70Marks**
Continous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**Multivibrators** ➢ Astable multivibrator ➢ Monostable multivibrator ➢ Bistable multivibrator ➢ Timer IC 555 ➢ Astable operation of IC 555 ➢ Monostable operation of IC 555 ➢ Examples	15	18
2	**Electronic Devices and its applications** ➢ Light activated silicon controlled Rectifier(LASCR) and its applications ➢ Liquid crystal Display (LCD) and its applications ➢ Thermistors and its applications ➢ Varactor diode and its applications ➢ Tunnel diode and its applications	15	18
3	**Frequency and Phase Modulations** ➢ Frequency Modulation – Characteristics of FM wave – Analysis of FM wave – Power relation in FM wave – Frequency spectrum of FM wave – Band width of FM wave ➢ Reactance method for producing FM wave (i) Transistor Reactance modulator (ii) FET Reactance modulator ➢ Comparison of FM and AM ➢ Phase Modulation – Definition – analysis comparison with FM wave – Production of FM wave by phase modulation – Armstrong phase modulator FET circuit	15	17
4	**Demodulation (Detection)** ➢ Principle of AM detection and classification of AM detectors ➢ Envelope diode detector ➢ Op-Amp envelope detector	15	17

	➢ Automatic volume (gain) control ➢ Frequency modulation – Slope detector – balanced slope detector		

Course Outcome - Learner will able to learn the basic conceptual and theoretical aspects of Electronics, Communication and their applications.

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-606

1. Hand book of Electronics By Gupta and Kumar – Pragati prakashan(Thirty Nineth Edition)
2. Electronic devices and circuit theory By Boylestad and Nashelsky (Tenth Edition) – Pearson (Prentice Hall)
3. Physics of semiconductor Devices By S.M.Sze
4. Electronic device and circuits By Allen Motershed- PHI

MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

(With effect from Academic Year 2019-20)

B.Sc. (PHYSICS)
SEMESTER-VI

PHY-CC-607: PRACTICAL (Based on paper P- 603 to 606)

Credits: 12

Marks: Semester End Examination: **200 Marks**

DETAILED CURRICULUM FOR PRACTICAL [Based on paper P- 603 TO 606]

Students have to prepare their Practical journals of Physics for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

There shall be Local Excursion and Study tour in any part of India for the subjective study. It may include visit to Scientific Research laboratories, Observatories, R & D Departments of Industries and government institutions etc. Students shall have to submit field report/Tour report in their Journal. Design of the practical setup should be such that student can develop their skill of connection of discrete components.

Detailed Syllabus for Physics practical	Teaching Hours
SECTION - A (GENERAL PHYSICS AND HEAT):	
1. To determine "g " by Kater's pendulum (Variation of Mass).	3
2. To determine young modulus Y and η using Flat spiral spring.	3
3. To calibrate the platinum resistance thermometer and to finde out melting point of wax	3
4. To determine poission ratio of glass plate by Cornu's Optical interference method.	3
5. To determine and study the variation of moment of inertia of a system.	3
SECTION – B LIGHT AND MODERN PHYSICS	
1. To determine the wavelength monochromatic light by diffraction at straight edge.	3
2. To determine unknown wavelength using Hartmann's formula.	3
3. To calibrate spectrometer by Edser Butler plate and to determine unknown wavelength.	3
4. To determine refractive index of liquid by Bi prism.	3
5. To determine the wavelength of given LASER beam using diffraction grating	3
6. To estimate charge of electron using Millican's oil drop method.	3
7. Absorption spectrum of Iodine molecule.	3
8. To study intrinsic photoconduction of photovoltanic cell with following objectives.	3
(a) To find value of planck radiation constant.	
(b) To determine the threshold frequency value thereby work funtion w_0 of photo voltanic cell.	
(c) To verify photoelectric equation.	

9. To estimate the intensity of β rays when passing through different thickness of alumiuim and to determine the linear absorption coefficient of aluminium.	

SECTION - C (ELECTRICITY AND MAGNETISM)

1. To determine the capacitance and power factor of a capacitor by Schering Bridge. 03
2. To estimate the magnetic volume susceptibility of solution by Quink's method. 03
3. To determine the self inductance of a given coil by Rayleigh's method. 03
4. To determine the self inductance of a given coil by Maxwell's bridge. 03
5. To study variation of thermo-electric emf with temperature for thermo couple. 03
6. To study time constant of an R.C.circuit experimentally and verify result theoretically. 03

SECTION – D (ELECTRONICS)

1. To study FET as a voltmeter. 03
2. To study multivibrator 03
3. To study SCR characteristics. 03
4. To study inverting and Non inverting operational amplifier. 03
5. To study two stages RC amplifier.. 03
6. To study a CE amplifier circuit with following objectives. 03

TEXT BOOKS RECOMMENDED FOR PAPER PHY -CC-607

1) Advanced practical physics by Chauhan And Singh
2) B.Sc.Practical Physics by C L Arora
3) Practical Physics by Kumar and Gupta