




**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

	<b>KADI SARVA VISHWAVIDYALAYA</b>					
	<b>B.SC.PHYSICS SEMESTER - 6 SCHEME</b>					
<b>Subject Code</b>	<b>Course</b>	<b>Instructions Hrs / week</b>	<b>Examination</b>			<b>Credit</b>
			<b>Internal</b>	<b>University Exam</b>	<b>Total</b>	
CPH-601	Mathematical Physics-II and Quantum Mechanics	3	30	70	100	3
CPH-602	Thermodynamics and Statistical Mechanics	3	30	70	100	3
CPH-603	Nuclear and Particle Physics	3	30	70	100	3
CPH-604	Solid State Physics	3	30	70	100	3
FCG-601	( University Elective ) Basic English – V	2	15	35	50	2
EGC-601	(Generic Elective - Institute elective) Personality Development & Interview Skills	2	50	00	50	2
SE PH 601-A	(Discipline Specific Specialization) Engineering Physics- IV	2	50	00	50	2
SE PH 601-B	(Discipline Specific Specialization) Applied Physics-IV					
PPH-601	Physics Practical – V	12	0	200	200	6
<b>Total</b>		<b>30</b>	<b>235</b>	<b>515</b>	<b>750</b>	<b>24</b>



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**CPH-601- Mathematical Physics-II and Quantum Mechanics**

**RATIONALE:** This course is designed to enable students to acquire basic understanding of the basic principles of physics.

**LEARNING OUTCOMES:**

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 601	Mathematical Physics-II and QuantumMechanics	3	45	30	70	100

**COURSE CONTENT:**

**Unit-1: Mathematical Physics**

Ordinary Differential Equations: Separable equations, Linear First Order Equations, Other Methods for First order equations, Second order linear equations with constant coefficients and zero right hand side, second order linear equations with constant coefficients and right hand side not zero, other second order equations, Illustrative Examples.

**Unit -2: Time Independent Schrodinger Equation**

The Harmonic Oscillator, The Algebraic Method, The Analytic Method, The Free Particle, The Delta Function Potential, The Finite Square well, Illustrative Examples.

**Unit -3: Formalism**

Hilbert Space, Observables, Eigen functions of a Hermitian Operator, Generalized Statistical Interpretation, The Uncertainty Principle, Introduction to Dirac notation, Illustrative Examples.



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**REFERENCES**

1. Mathematical Physics by P. K. Chatopadhyay. Wiley East Ltd.
2. Mathematical Physics by B.D.Gupta.
3. Mathematical Physics by H.K.Dass.4. Nuclear Physics by S.B.Patel (New age International (p) Ltd. Publishers)
4. Introduction to Quantum Mechanics, David J Griffiths, Second Edition.

**INSTRUCTION STRATEGIES**

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme %Weightage</b>	<b>Teaching Scheme No. of Lecture</b>
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45



**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

**CPH602- Thermodynamics and Statistical Mechanics**

**RATIONALE:** This course is designed to enable students to acquire basic understanding of the basic principles of physics.

**LEARNING OUTCOMES:**

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 602	Thermodynamics and Statistical Mechanics	3	45	30	70	100

**COURSE CONTENT:**

**Unit -1**

First-Order Phase Transitions; Clausius-Clapeyron Equation, Clausius-Clapeyron Equation and Phase Diagrams, Clausius-Clapeyron Equation and the Carnot Engine, Chemical Potential, Open Hydrostatic Systems in Thermodynamic Equilibrium, Illustrative Examples.

**Unit -2**

Statistical Mechanics, Fundamental Principles, Equilibrium Distribution, Significance of Lagrangian Multipliers  $\alpha$  and  $\beta$  and  $\Omega$  Partition Function for Canonical Ensemble, Partition Function of an Ideal Monatomic Gas, Equipartition of Energy, Distribution of Speeds in an Ideal Monatomic Gas, Statistical Interpretation of Work and Heat, Entropy and Information, Illustrative Examples.

**Unit -3**

Thermal Properties of Solids, Statistical Mechanics of a Nonmetallic Crystal, Frequency Spectrum of Crystals, Thermal Properties of Nonmetals, Thermal Properties of Metals, Illustrative Examples.



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**REFERENCES:**

1. Fundamentals of Statistical and Thermal Physics by F. Reif, Sarat Book House
2. Heat and thermodynamics, M. W. Zemansky, Richard H. Dittman, McGraw-Hill Science Engineering Math (1996)
3. Statistical and Thermal Physics: Fundamentals and Applications by M. D. Sturge, A K Peters/CRC Press; 1 edition (24 September (2003)
4. Fundamentals of Statistical Mechanics by B. B. Laud. New Age International Publisher (copy right 1998)
5. Statistical Mechanics and Properties of Matter by E.S.R.Gopa
6. Elements of Solid State Physics by J.P. Srivastava, PHI New Delhi (2003)

Fundamentals of Statistical and Thermal Physics

**INSTRUCTION STRATEGIES**

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme % Weightage</b>	<b>Teaching Scheme No. of Lecture</b>
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45



**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

**CPH603- Nuclear and Particle Physics**

**RATIONALE:** This course is designed to enable students to acquire basic understanding of the basic principles of physics.

**LEARNING OUTCOMES:**

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 603	Nuclear and Particle Physics	3	45	30	70	100

**COURSE CONTENT:**

**Unit -1**

**Nuclear Models**

Introduction, A survey of some nuclear properties, nuclear sizes and densities, nuclear masses and abundances, the liquid drop model, magic numbers, the fermi gas model, the shell model, predictions of the shell model, the collective model, Illustrative Examples.

**Unit -2**

**Nuclear Decay and Nuclear Reactions**

Introduction, Alpha decay, Beta decay, The Beta decay interaction, Gamma decay, The Mossbauer effect, Nuclear reactions, Excited states of nuclei, fission and reactors, fusion and the origin of elements, Illustrative Examples.

**Unit -3**

**Introduction to elementary particles**

Introduction, Nucleon forces, Isospin, Pions, Leptons, Strangness, Families of elementary particles, Observed interactions and conservation laws, Illustrative Examples.

**REFERENCES:**

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|--|
| 1. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Robert Eisberg, Robert Resnick, Wiley, 1985 |
| 2. Introduction to Nuclear Physics by H. Enge, Addison Wesley  |
| 3. Nuclear Physics by D. C. Tayal, Himalaya Publisher  |
| 4. Nuclear Physics by Irvin Kaplan   |



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**INSTRUCTION STRATEGIES**

4. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
5. Monitoring of the students performing the experiments.
6. Evaluation of results of each experiment.

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme %Weightage</b>	<b>Teaching Scheme No. of Lecture</b>
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45



**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

**CPH604- Solid State Physics**

**RATIONALE:** This course is designed to enable students to acquire basic understanding of the basic principles of physics.

**LEARNING OUTCOMES:**

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 604	Solid State Physics	3	45	30	70	100

**COURSE CONTENT:**

**Unit -1**

Introduction to quantum statistics, Indistinguishability and quantum statistics, The Quantum Distribution Functions, Comparison of Distribution functions, The specific heat of a crystalline solid, The Boltzmann distribution as an approximation to quantum distribution, Illustrative Examples.

**Unit -2**

The Photon Gas, The Phonon Gas, Bose Condensation and Liquid Helium, The free electron gas, Contact potential and thermionic emission, Classical and Quantum description of the state of the system, Illustrative Examples.

**Unit -3**

Conductors and semiconductors

Introduction, types of solids, band theory of solids, electrical conduction in metals, the quantum free electron model, the motion of electrons in a periodic lattice, effective mass, electron-positron annihilation in solids, semiconductors, semiconductor devices,

Superconductivity, magnetic properties of solids, Paramagnetism, Ferromagnetism, Antiferromagnetism and Ferrimagnetism, Illustrative examples.





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**REFERENCES:**

1. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Robert Eisberg, Robert Resnick, Wiley, 1985.
2. Elements of Solid State Physics by J. P. Srivastava, Prentice-Hall of India Private Limited, New Delhi
3. Introduction to Solid State Physics by C. Kittel, (Eight Edition) John Wiley and Sons

**INSTRUCTION STRATEGIES**

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme %Weightage</b>	<b>Teaching Scheme No. of Lecture</b>
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45



**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

**FCG 601-Basic English – VI**

**RATIONALE:** This course is designed tenable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

**LEARNING OUTCOMES:**

- Understand the functions and usage of sentence framing, sentence correction and synthesis the sentences
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms, etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire writing skill through developing story.
- Acquire the speaking skill through speeches.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
FCG - 602	Basic English – VI	2	24	15	35	50

<b>Unit 1:</b>	<b>Number of lectures:8</b>	<b>Weightage 33%</b>
<b>Lesson 2: <i>Between the Mosque</i></b>		
<b>Lesson 7: <i>My Financial Career</i></b>		
<b>Lesson 8: <i>Speech on Indian Independence</i> Poem 14: <i>The World is Too Much with us</i> Poem 15: <i>Success is Counted Sweetest</i> Poem 16: <i>I, Too, Sing America</i></b>		
<b>The Joy of Reading selected Prose &amp; Poetry</b>		



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<b>Unit 2: Grammar</b>	<b>Number of lectures: 4</b>	<b>Weightage 17%</b>
<ul style="list-style-type: none"><li>- Transformation, Correction (prepositions, Tenses, Concord)</li><li>- Synthesis of Sentences</li><li>- Avoiding Common errors in English Grammar</li></ul>		
<b>Unit 3:</b>	<b>Number of lectures: 8</b>	<b>Weightage 33%</b>
<ul style="list-style-type: none"><li>• Questionnaire ( on current Issues i.e. Social, political, Educational)</li><li>• Components of Questionnaire</li></ul>		
<b>Unit 4 Preparing Speeches</b>	<b>Number of lectures: 4</b>	<b>Weightage 17%</b>
<ul style="list-style-type: none"><li>- Introducing Chief Guest</li><li>- Farwell Speech</li><li>- Speech on annual functions</li><li>- Mourning the Death of VIP</li><li>- Speech on Republic Day</li></ul>		

**REFERENCES**

1. High School English Grammar – Wrenn & Martin
2. Contemporary English Grammar – David Green

**INSTRUCTION STRATEGIES**

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Powerpoint presentation), Notes, Question Banks, References and Reprints/ Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme</b>	<b>Teaching Scheme</b>
Unit 1	33	8
Unit 2	17	4
Unit 3	33	8
Unit 4	17	4
<b>Total</b>	<b>100</b>	<b>24</b>



**KADI SARVA VISHWAVIDYALAYA**  
**B.Sc Semester 6 Syllabus (W.E.F. June 2019)**

**EGC 601- Personality Development & Interview Skills**

**RATIONALE:** This course is designed to enable students to acquire basic understanding of the components of professional communication, the skills required for the same and practice them.

**LEARNING OUTCOMES:**

- To build confidence for communicating in English and create interest for the life-long learning of English language
- To describe and characterize spoken English both from the grammatical and the discourse perspectives.
- To draw comparisons between oral and written language through the use of representative oral and written language.

**TEACHING AND EVALUATION SCHEME:**

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hr S.	Max Marks		
				Mid Term	End Term	
<b>EGC- 601</b>	<b>Personality Development &amp; Interview Skills</b>	<b>2</b>	<b>24</b>	<b>50</b>	<b>--</b>	<b>50</b>

**COURSE CONTENT**

<b>Unit – I Self Development and Communication:</b>	<b>Number of lectures: 12</b>
	<b>Weightage: 50%</b>
(a) Professional Etiquettes	
(b) Goal Setting	
(c) Time Management	
(d) Stress Management	



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<b>Unit – IIA. Writing Skills</b>	<b>Number of lectures: 06</b>	<b>Weightage: 25%</b>
(a) Resume writing (Application Que)		
(b) Report Writing (Application Que)		
(c) E-mail etiquettes		
<b>Unit II B. Interview Skills</b>		<b>Weightage: 25%</b>
(a) Types of Interview		
(b) Preparation of an Interview		
(c) Effective guidelines for an interview		

**RECOMMENDED READING:**

1. V. Sasikumar : A Course in Listening and Speaking – I, Cambridge Uni. Press
2. G. Taylor: English Conversation Practice, Tata Mcgraw-Hill Publishing Co. Ltd.
3. Wrenn&Martin: High School English Grammar & Composition, S, Chand Pub.
4. Kumar S and Lata P Communication Skills 2011: New Delhi Oxford University Press

**INSTRUCTION STRATEGIES**

1. Interaction with the students to understand the level of students.
2. Teaching the topics included in the syllabus with the help of tool like Power point presentation, Notes, References, Copy of Articles, Models, diagram

**TEACHING AND EXAMINATION**

<b>UNIT</b>	<b>Examination Scheme %Weightage</b>	<b>Teaching Scheme No. of Lecture</b>
Unit 1	50	12
Unit 2	50	12
Total	100	24



**KADI SARVA VISHWAVIDYALAYA**  
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**PPH 601- Physics Practical-VI**

**RATIONALE:** This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

**LEARNING OUTCOMES:**

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

**TEACHING AND EVALUATION SCHEME:** The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 601	Physics Practical-VI	6	12	200	200

**LIST OF EXPERIMENTS**

**Group-1 (Non-circuitry I)**

1. Young modulus 'y' by Koenig method.
2. Optical Lever
3. Viscosity by Log decrement
4. I-V Characteristic of solar cell and determination of F.F, V.F. &n.
5. G.M. Counter (Comparison of Intensities)



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**Group-2 (Non-circuitry II)**

1. To determine air gap 't' between two plates of F.P. Etalon and determination of wavelength ' $\lambda$ ' of monochromatic light
2. Temperature of Flame
3. Newton's Ring (Determination of Wave length of Light).
4. To determine  $\lambda$  and  $d\lambda$  of sodium light using Michelson interferometer
5. Determination of wavelength of light by Lloyd's mirror

**Group-3 (Circuitry III)**

1. Mutual induction 'M' of two coil using B.G.
2. High resistance 'R' using leakage method
3. Maxwell's Bridge
4. Solenoid Inductor
5. Susceptibility of  $\text{FeCl}_3$  using Quienk's method

**Group-4 (Circuitry IV)**

1. A study of transistorized Colpit's oscillator using CRO/Wave meter
2. Negative Feedback Amplifier
3. A study of Halfsubtractor and Full subtractor
4. To determine frequency of AFO using Wein bridge
5. Use of Computer- Programming in 'C' language.

**Note: New experiments can be introduced AND/OR replaced as per the need by the permission of the Head/Principal of Institute**

**INSTRUCTION STRATEGIES**

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipment, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

**Pattern of University Practical Exam**

**Time: 10:30am to 6:00pm (Including 30 minutes recess)      Total Marks: 200**

**First Day**

**(A) Group-1 (35 marks)**

**(B) Group-2 (35 marks)**

✓ Any one experiment to be performed from each group of experiments.

✓ **Evaluation Scheme:**

○ Aim / Apparatus	- 2	marks
○ Diagrams/ Circuit Diagrams	- 5	marks
○ Observation Tables	- 15	marks
○ Calculations / Plots	- 10	marks



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- Results, Discussion & Conclusion - 3 marks

**(C) Viva- Voce on practical base (24 marks)**

✓ **Evaluation Scheme:**

- Group-1 - 12 marks
- Group-2 - 12 marks

**Second Day**

**(A) Group-3 (35 marks)**

**(B) Group-4 (35 marks)**

- ✓ Any one experiment to be performed from each group of experiments.

✓ **Evaluation Scheme:**

- Aim / Apparatus - 2 marks
- Diagrams/ Circuit Diagrams - 5 marks
- Observation Tables - 15 marks
- Calculations / Plots - 10 marks
- Results, Discussion & Conclusion - 3 marks

**(C) Viva- Voce on practical base (24 marks)**

✓ **Evaluation Scheme:**

- Group-3 - 12 marks
- Group-4 - 12 marks

**Journal (12 marks)**

**Note: Certified practical journal is compulsory for practical exam.**









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**THEORY EXAMINATION QUESTION PAPER PATTERN**  
**SUBJECT: Physics semester-5 & semester-6 (NEW CBCS Syllabus)**

**KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR**  
**B.Sc. Physics Semester-5/6 (NEW), End Term Examination, Month/Year**  
**Subject: Code-Title**

**Date:** \_\_\_\_\_ **Time: 3 hrs.** **Maximum marks: 70**

Que-1	(A) Write any two out of Three questions.	12 marks
	(B) Write any One out of Two questions.	8 marks
Que-2	(A) Write any two out of Three questions.	12 marks
	(B) Write any One out of Two questions.	8 marks
Que-3	(A) Write any two out of Three questions.	12 marks
	(B) Write any One out of Two questions.	8 marks
Que-4	Write any Ten out of Twelve (Four questions to be asked from each unit) Short question/MCQ/Short numerical/Diagram/Match the following, True or False, Fill in the blanks	10 marks each
Total		70 marks