Study & Evaluation Scheme

of

Bachelor of Science (Hons.) (Physics)

[Applicable for Academic Session 2017-18]

[Approved by Hon'ble VC dated August 08, 2017]

[With revision approved by VC date July 23, 2018, August 14, 2018 & November 29, 2019]

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme
Bachelor of Science (Hons.)
SUMMARY

Programme	:	B.Sc. (Hons.) – Physics
Duration	:	Three-year full time (Six Semesters)
Medium	:	English
Minimum Required Attendance	:	75 %
Credit	:	
Maximum Credit	:	145
Minimum credit required for the degree	:	141

Assessment :

Internal	External	Total
40	60	100

Internal Evaluation (Theory Papers) :

Class Test I	Class Test II	Class Test III	Assignment(s)	Attendance	Total
Best two out of three					
10 Marks	10 Marks	10 Marks	10 Marks	10 Marks	40 Marks

Evaluation of Practical :

Internal	External	Total
50	50	100

Evaluation of Seminar/Viva :

Internal	External	Total
50	50	100

Duration of Examination :

External	Internal
3 hrs.	$1\frac{1}{2}$ hrs

(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher's continuous evaluation shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

1. *The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).*
2. *Remaining five questions will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No. 2 to 6 shall be 10 marks each.*
3. *Usually each question in the examination should be designed to have a numerical component, where part of syllabus.*

Note 1:

Evaluation Scheme for MOOC, Short Term Courses:

University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind the Academic Council in its 10th meeting on February 13, 2016, approved the University proposal and allowed a maximum of two credits to be allocated for MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through edX, Coursera, IIRS and NPTEL could be given a maximum credit of two with 1 credit for credit with 30-60 contact hours and 2 credits for courses having more than 60 credit hours.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

1. There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
2. The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalise a list of courses to be offered with credits defined for each course and the mode of credit consideration of the student. The complete process including the approval of the Vice Chancellor shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course the approval will be valid only for the semester on offer.
3. A student can opt for a maximum of two MOOC courses for credit during the complete duration of the course other than offered under SWAYAM.
4. College can offer upto 20% credit through courses offered by SWAYAM. However, if the college is offering courses on other MOOC platforms, the total credit offered under MOOC will not exceed 20% including those offered under SWAYAM.
5. Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Co-ordinator MOOC through the Principal of the College.

6. Where the MOOC course or Add-on on courses are only offering certificate of successful completion, and credit has been assigned to the course, the University examination division will conduct a MCQ examination for the course with 50 MCQ with 100 marks to facilitate inclusion of the courses in CPI computation.
7. College will define whether the credits are regular credits or to be considered only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.
8. In case the College wants the additional course to be shown in the mark sheet as additional course completed by the students the same shall also be mentioned by the College and the student will opt for the same at the time of taking admission to the course.

Study & Evaluation Scheme

Semester I

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	BAS119	Mathematical Physics-I	4	-	-	4	40	60	100
2	BAS114/ BAS213	Mechanics	4	-	-	4	40	60	100
3	BAS120	Fundamentals of Inorganic Chemistry	4	-	-	4	40	60	100
4	BCS111/ ECS212	Computer System & Programming in C++	3	-	-	3	40	60	100
5	BHM199/ EHM199	English communication & soft skill –I	1	1	2	2	50	50	100
6	BAS166/ BAS267	Mechanics (Lab)	-	-	3	2	50	50	100
7	BAS168	Fundamentals of Inorganic Chemistry (Lab)	-	-	3	2	50	50	100
8	BCS161/ ECS262/	Computer System & Programming in C++ (Lab)	-	-	2	1	50	50	100
9	BGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
	Total		**16**	**1**	**10**	**22**	**460**	**440**	**900**

Semester II

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	BAS218	Electricity and Magnetism	4	-	-	4	40	60	100
2	BAS220	Waves & optics	4	-	-	4	40	60	100
3	BAS219	Fundamentals of Physical Chemistry	4	-	-	4	40	60	100
4	BAS214/ EAS115/ BAS328/ BAS428	Environmental Studies	1	2	-	2	40	60	100
5	BHM249/ EHM249	English Communication & Soft Skill-II	1	1	2	2	40	60	100
6	BAS268	Electricity and Magnetism (Lab)	-	-	3	2	50	50	100
7	BAS266	Waves & Optics (Lab)	-	-	3	2	50	50	100
8	BAS269	Fundamentals of Physical Chemistry (Lab)	-	-	3	2	50	50	100
9	BGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
	Total		**14**	**3**	**11**	**22**	**450**	**450**	**900**

Semester III

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	BAS314	Elements of Modern Physics	4	-	-	4	40	60	100
2	BAS318	Mathematical Physics-II	4	-	-	4	40	60	100
3	BAS320	Thermal Physics	4	-	-	4	40	60	100
4	BAS321	Fundamentals of Organic Chemistry	4	-	-	4	40	60	100
5	BHM349/ EHM349/449	English Communication & Soft Skill-III	1	1	2	2	40	60	100
6	BCS311/ ECS511/ 611/411/ MSC014	Database Management System	3	1	-	4	40	60	100
7	BAS364	Elements of Modern Physics (Lab)	-	-	3	2	50	50	100
8	BAS365	Thermal Physics (Lab)	-	-	3	2	50	50	100
9	BAS366	Fundamentals of Organic Chemistry (Lab)	-	-	3	2	50	50	100
10	BGP311	Discipline & General Proficiency	-	-	-	1	100	-	100
	Total		**20**	**2**	**11**	**29**	**490**	**510**	**1000**

Semester IV

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	BAS420	Mathematical Physics-III	4	-	-	4	40	60	100
2	BAS421	Semiconductor Physics	4	-	-	4	40	60	100
3	BAS422	Atomic & Molecular Physics	4	-	-	4	40	60	100
4	BAS423	Material Science	4	-	-	4	40	60	100
5	BHM499/ EHM599/699	English Communication & Soft Skill-IV	1	1	2	2	50	50	100
6	BAS464 /EEC762	Design and installation of Solar Photovoltaic System	-	2	2	2	50	50	100
7	MOOC12	MOOC Program-I (Mandatory)	-	-	-	1/2	-	100	100
8	BGP411	Discipline & General Proficiency	-	-	-	1	100	-	100
	Total		**17**	**3**	**4**	**22/23**	**360**	**440**	**800**

Semester V

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	BAS520	Electromagnetic Theory	4	-	-	4	40	60	100
2	BAS521	Laser Physics	4	-	-	4	40	60	100
3	BAS522	Classical Mechanics	4	-	-	4	40	60	100
4	BAS523	Quantum Mechanics	4	-	-	4	40	60	100
5	BAS524	Solid State Physics	4	-	-	4	40	60	100
6	BAS565	Introduction to MATLAB	-	2	2	2	50	50	100
7	BAS566	Laser Physics (Lab)	-	-	3	2	50	50	100
8	BAS567	Solid State Physics (Lab)	-	-	3	2	50	50	100
9	MOOC22	MOOC Program-II (Optional)	-	-	-	1/2	-	100	100
10	BGP511	Discipline & General Proficiency	-	-	-	1	100	-	100
	Total		**20**	**2**	**8**	**27**	**450**	**450**	**1000**

Semester VI

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	***T***	***P***		***Internal***	***External***	***Total***
1	BAS620	Statistical Mechanics	4	-	-	4	40	60	100
2	BAS621	Nuclear & Particle Physics	4	-	-	4	40	60	100
3	BAS622	Medical Physics	4	-	-	4	40	60	100
4	BAS623	Atmospheric Physics	4	-	-	4	40	60	100
5	**Open Elective**								
	BAS011	Introduction to Statistical Package for Social Sciences	3	-	-	3	40	60	100
	BAS012	Industrial Chemistry							
	BAS013	Introduction to Nano Science and Technology							
6	BAS698	Seminar, Viva & Presentation	-	-	4	2	50	50	100
7	BGP611	Discipline & General Proficiency	**-**	**-**	**-**	1	100	-	100
	Total		**19**	**0**	**4**	**22**	**350**	**350**	**700**

Semester-I
Mathematical Physics-I

Course Code: BAS119 **L T P C**
4 0 0 4

Objective:

- The emphasis of course is on applications in solving problems of interest to physicists.
- The students are to be examined entirely on the basis of problems, seen and unseen.

Course Contents:

Unit I **(08 Lectures)**

Calculus and First Order Differential equations: Recapitulation: Limits, continuity, differentiation. Plotting functions. First Order Differential Equations: Variable separable, Homogeneous, Integrating Factor, Exact differential forms and their reducible forms.

Unit-II **(08 Lectures)**

Differential equations of Second Order: Second Order Linear Differential Equations with constant coefficients, Particular Integral, Second Order Homogeneous Differential Equations with constant coefficients, Wronskian and general solution, Variation of parameters.

Unit-III **(08 Lectures)**

Vector Calculus and Calculus of functions of more than one variable: Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. Partial derivatives. Integrating factor with simple illustration. Constrained Maximization using Lagrange Multipliers.

Unit-IV **(08 Lectures)**

Vector Differentiation and Vector Integration: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Vector identities. Line, surface and volume integrals of Vector fields.

Unit-V **(08 Lectures)**

Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, spherical and cylindrical coordinates. Green's Theorems and Stokes Theorems, Gauss' divergence theorem, and their applications (no rigorous proofs).

Text & Reference Books:

1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, Elsevier.
2. An introduction to ordinary differential equations, E.A. Coddington, PHI learning Differential Equations, George F. Simmons, McGraw Hill.
3. Mathematical Tools for Physics, James Nearing, Dover Publications.
4. Mathematical methods for Scientists and Engineers, D.A. McQuarrie, Viva Book Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, Jones and Bartlett Learning.
5. Mathematical Physics, Goswami, Cengage Learning.
6. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
7. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley India.
8. Essential Mathematical Methods, K. F. Riley & M. P. Hobson, Cambridge Univ. Press

*** Latest editions of all the suggested books are recommended**

Semester I
Mechanics

Course Code: BAS114/BAS213

L	T	P	C
4	0	0	4

Objective: To understand the fundamentals of physics like Linear Momentum, Rotational Dynamics, Motion under Central Forces, Properties of Matter etc.

Course Contents:

Unit I **(08 Lectures)**

Rotational Dynamics:

Centre of Mass and Laboratory frames. Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation, Motion involving both translation and rotation.

Unit II **(08 Lectures)**

Fluid Motion:

Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. **Gravitation and Central Force Motion:** Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. **Non-Inertial Systems:** Non-inertial frames and fictitious forces. Uniformly rotating frame. Centrifugal force. Coriolis force.

Unit III **(08 Lectures)**

Elasticity:

Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Central Forces: Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

Unit IV **(08 Lectures)**

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor.

Unit V **(08 Lectures)**

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Massless Particles. Lorentz Transformations: Simultaneity, Length contraction, Time dilation, Twin Paradox, Relativistic addition of velocities, Variation of mass with velocity. Mass energy Equivalence.

Text & Reference Books:

1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, McGraw-Hill.
2. Mechanics, Berkeley Physics, vol.1, C. Kittel, W. Knight, et.al. Tata McGraw-Hill. Physics, Resnick, Halliday and Walker, Wiley.
3. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. Cengage Learning.
4. Feynman Lectures, R. P. Feynman, R. B. Leighton, M. Sands, Pearson Education Introduction to Special Relativity, R. Resnick, John Wiley and Sons. University Physics, Ronald Lane Reese, Thomson Brooks/Cole.
5. Mechanics, D.S. Mathur, S. Chand and Company Limited, University Physics.
6. J.W. Jewett, R.A. Serway, Cengage Learning Theoretical Mechanics, M.R. Spiegel, Tata McGraw Hill.

*** Latest editions of all the suggested books are recommended**

Semester I
Fundamentals of Inorganic Chemistry

Course Code: BAS 120	L	T	P	C
	4	0	0	4

Objective: To expose with different type of physical phenomenon and instruments in Fundamentals of inorganic chemistry like study of atomic structure, periodicity of elements, chemical bonding and basics of inorganic chemistry.

Course Contents:

UNIT – I **(08 Lectures)**

Atomic Structure:

Schrödinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of *s, p, d* and *f* orbitals.Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations..

UNIT – II **(08 Lectures)**

Periodicity of Elements:

Effective nuclear charge, shielding or screening effect, Atomic & ionic radii, Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy, Electron gain enthalpy, Electronegativity, trends in periodic table and applications in predicting and explaining the chemical behavior.

UNIT – III **(08 Lectures)**

Chemical Bonding – I:

Z6Covalent bond: Valence Bond theory & its limitations. Hybridization & shapes of simple inorganic molecules & ions, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons. Resonance and resonance energy, Molecular orbital theory & MO diagrams of Homo & heteronuclear (CO, NO) diatomic molecules.

UNIT – IV **(08 Lectures)**

Chemical Bonding – II:

Ionic Solids: Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice energy and Born-Haber cycle, salvation energy and solubility of ionic solid.

UNIT – V **(08 Lectures)**

Chemical bonding III:

Metallic bond-free electron, Semiconductors & insulators, valence bond and band theories.

Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding, Effects of chemical force, melting and boiling points, solubility & energetics of dissolution process.

Oxidation-Reduction: Redox equations, Standard Electrode Potential and its application to inorganic reactions.

Text & Reference Books:

1. Lee, J.D. Concise Inorganic Chemistry ELBS.
2. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press.
3. Rodger, G.E. Inorganic and Solid-State Chemistry, Cengage Learning India Edition.

*** Latest editions of all the suggested books are recommended**

Semester I
Computer System & Programming in C++

Course Code: BCS111 /ECS212 **L T P C**
3 0 0 3

Objective: To learn the basics of computers & C++ programming language.

Course Contents:

Unit I **(Lectures 08)**

Problem Solving: Phases of problem solving, Algorithms, Structure Chart, Flow chart, Practice of solving Sequence Problems, Selection Problems, Repetition problem.
Statements for problem solving: if, switch, while, for, do, break, continue, go to statements.

Unit II **(Lectures 08)**

Concepts in Computer Application: Generations, Characteristic and Application of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory.
Translators: Assembler, Compiler, and Interpreter; Number System: Decimal, Octal, Binary and Hexadecimal &their Conversions; Various Codes: BCD, ASCII and EBCDIC and Gray Code.

Unit III **(Lectures 08)**

Concepts in Operating System: Purpose, Services, Types, Functions.
Data Communication & Networks: Types, Topology, IP address classes.
C++ Basics: Data types, Variables, Constants, Keywords, Identifiers, Types of Operators, Memory Allocation operators, Expressions, Pre-processor directives, Introduction to Array, Pointers, Structures and Strings.

Unit IV **(Lectures 08)**

Functions: Scope of variables; Parameter passing; Default arguments; Inline functions; Recursive functions; Pointers to functions.
C++ Classes and Data Abstraction: Class Structure, Objects; this pointer; Friend function; Static class members; Constructors and Destructors; Data abstraction.
Inheritance: Types, Access to the base class members; Virtual base class.

Unit V **(Lectures 08)**

Polymorphism: Function overloading; Operator overloading; Static Binding and Dynamic bindings; Virtual function: Definition, Call mechanism, Pure virtual functions; Virtual destructors; Abstract Classes.
C++ I/O: Stream classes hierarchy; Stream I/O; File streams; Overloading << and >> operators; File Modes, Reading and Writing to a file; Formatted I/O.

Text Books-

1. Bjarne Stroutrup, The C++ Programming Languge, Adison Wesley.
2. Object-Oriented Programming with C++, Balagurusamy, TMH
3. C++ The Complete Reference, Schildt, TMH
4. Programming in C++, Shah & Thaker, ISTE/EXCEL

Reference Books-

1. Beginning C++, The Complete Language, Horton,SPD/WROX
2. Programming with C++, Radhaganesan, Scitech
3. Projects using C++, Varalaxmi, Scitech
4. Object Oriented modelling & Design, RumBaugh, PHI

***Latest editions of all the suggested books are recommended.**

Semester I
English Communication and Soft Skills – I

Course Code: BHM199/EHM199 **L T P C**

1 1 2 2

Objectives:

1. To remove the phobia of conversing in English.
2. To make the learners enable to express themselves among peers & teachers.
3. To enable learners, improve their vocabulary.
4. To introduce them with basic communicative skills in real life situations

Course Contents:

Unit – I Fear of Failure, Reasons of Fear of Failure & How to overcome it (12 hours)

- Self-Introduction
- Identifying strengths and weakness
- Fear of Failure: Signs of Fear of Failure, Reasons of Fear of Failure, Strategies to overcome Fear of Failure
- Positive Attitude
- Motivation
- Building Self Confidence

Unit – II Confidence, Presentability, Etiquettes & Manners (10 hours)

- Body Language: Facial Expression, Eye Contact, Gesture, Posture, Tips to have appropriate body language
- Grooming & Dressing Sense
- Etiquette & Manners: Social Etiquettes, Telephonic Etiquettes, Dining Etiquettes, Etiquettes to handle cultural differences, Etiquettes of Effective Conversation.
- Problem Sounds (s-sh,j-z,v-b)

Unit – III Conversation Practice, commonly made mistake & Initiating a conversation (10 hours)

- Vocabulary of commonly used words (50 Words)
- Conversation Practice: At College, At Bank, At Ticket Counter (Railway Station & Movie Theatre)
- How to initiate a conversation
- Commonly made mistakes in conversation
- Basic of Communication: 7Cs of Communication

Unit – IV Application writing (08 hours)

- Format & Style of Application Writing
- Practice of Application writing on common issues.

Reference Books:

- Mitra, Barun. K. "*Personality Development and Soft skills*" New Delhi: Oxford University Press.
- Kumar, Sanjay. & Pushp Lata. "*Communication Skills"* New Delhi: Oxford University Press.
- Carnegie Dale. "*How to win Friends and Influence People*" New York: Simon & Schuster.
- Harris, Thomas. A. "*I am ok, You are ok*" New York: Harper and Row.
- Coleman, Daniel. "*Emotional Intelligence*" Bantam Book.

Methodology:

1. Language Lab software.
2. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
3. Conversational Practice will be effectively carried out by Face to Face & Via Media (Telephone, Audio-Video Clips)
4. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized.

Note:

- 2 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
50 Marks		50 Marks		100
40 Marks (Progressive Evaluation) After each unit-completion: Assignments / oral Presentation	10 Marks (Attendance)	25 Marks Midway external assessment (Viva)*	25 Marks (External Viva) **	

Note: *Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.*

***Parameters of Midway external assessment (Viva)**

Content	Dressing sense & Grooming	Confidence	Pronunciation	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: *To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.*

****Parameters of External Viva**

Content	Dressing sense & Grooming	Confidence	Pronunciation	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

***Note**: External Viva will be conducted by 3-member committee comprising*

- ***a)*** *Faculty teaching the class*
- ***b)*** *English faculty from other college of the University (As approved by VC).*
- ***c)*** *T&P officer of other colleges of the University (As approved by VC).*

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.

Semester-I
Mechanics (Lab)

Course Code: BAS166/BAS267 **L T P C**
0 0 3 2

List of Experiments:

Note: Select any ten experiments from the following list.

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine **g** and velocity for a freely falling body using Digital Timing Technique
7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10. To determine the elastic Constants of a wire by Searle's method.
11. To determine the value of g using Bar Pendulum.
12. To determine the value of g using Kater's Pendulum.

Text & Reference Books:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, Kitab Mahal.
4. Engineering Practical Physics, S. Panigrahi & B. Mallick, Cengage Learning India Pvt. Ltd.
5. Practical Physics, G.L. Squires, Cambridge University Press.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-I
Fundamentals of Inorganic Chemistry (Lab)

Course Code: BAS168 **L T P C**
0 0 3 2

Objective: To learn about practical knowledge of the alum, estimation of ions, titration and qualitative organic analysis in given samples.

List of Experiments:

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Estimation of oxalic acid by titrating it with KMnO4.
3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4.
4. Estimation of Fe (II) ions by titrating it with K2Cr2O7 using internal indicator.
5. Estimation of Cu (II) ions iodometrically using Na2S2O3.
6. Estimate the amount of nickel present in a given solution as bis (dimethylglyoximato) nickel(II) or aluminium as oximate in a given solution gravimetrically.
7. Estimation of (i) Mg2+ or (ii) Zn2+ by complexometric titrations using EDTA.
8. Estimation of total hardness of a given sample of water by complexometric titration.

Text & Reference Books:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson.
3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition.
4. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I
Computer System & Programming in C++ (Lab)

Course Code: BCS161/ECS262

L	T	P	C
0	0	2	1

List of Experiments:

Note: Minimum 15 experiments should be performed from the following:

1. Write a Program (WAP) to calculate Sum & average of N numbers.
2. WAP to convert integer arithmetic to a given number of day and month.
3. WAP to find maximum and minimum out of 3 numbers a, b & c.
4. WAP to find factorial of positive integer.
5. WAP to find sum of series up to n number, 2+5+8+..... +n.
6. WAP to print all the number between 1 to 100 which are dividing by 7.
7. WAP to generate Fibonacci series up to n.
8. WAP to calculate area of circle using Functions.
9. WAP to calculate factorial of given number using Recursion function.
10. WAP to find whether number is prime or not.
11. WAP to find that the enter character is a letter or digit.
12. WAP to find addition of two matrix of n*n order.
13. WAP to find multiplication of two matrix of n*n order.
14. WAP to find even or odd up to a given limit n.
15. WAP to find whether a given no is palindrome or not.
16. WAP to Swap two numbers using third Variable and without using third variable.
17. WAP to Swap two numbers using call by value and call by reference.
18. WAP illustrating overloading of various operators.
19. WAP illustrating use of Friend.
20. WAP illustrating use of Inline Function.
21. WAP illustrating use of destructor and various types of constructor.
22. WAP illustrating various forms of Inheritance.
23. WAP illustrating use of virtual functions, virtual Base Class.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP111

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester-II
Electricity and Magnetism

Course Code: BAS218

L	T	P	C
4	0	0	4

Objective: To provide a detailed and through knowledge of basic concept of electricity and magnetism.

Course Contents:

Unit I **(08 Lectures)**

Electric Field and Electric Potential:

Electric field: Electric field lines, Electric flux, Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. Electrostatic Potential. Laplace's and Poisson equations (Only statement). The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.

Unit II **(08 Lectures)**

Electrostatics: Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor.

Series & Parallel LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width.

Unit III **(08 Lectures)**

Dielectric Properties of Matter:

Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector **D**. Relations between **E**, **P** and **D**. Gauss' Law in dielectrics. **Network Theorems:** Thevenin theorem, Norton theorem, Superposition theorem.

Unit IV **(08 Lectures)**

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field **B**. Biot-Savart's Law and its simple applications: straight wire and circular loop. Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid (3) Infinite long wire. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements.

Unit V **(08 Lectures)**

Magnetic Properties of Matter: Magnetization vector (**M).** Magnetic Intensity (**H).** Magnetic Susceptibility and permeability. Relation between **B, H, M**. Ferromagnetism. B-H curve and hysteresis **Electromagnetic Induction:** Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Ballistic Galvanometer: Current and Charge Sensitivity.

Text & Reference Books:

1. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, Tata McGraw.
2. Electricity and Magnetism, Edward M. Purcell, McGraw-Hill Education.
3. Introduction to Electrodynamics, D.J. Griffiths, Benjamin Cummings.
4. Feynman Lectures, R. P. Feynman, R. B. Leighton, M. Sands, Pearson Education Elements of Electromagnetics, M.N.O. Sadiku, Oxford University Press.
5. Electricity and Magnetism, J. H. Fewkes & J. Yarwood, Oxford Univ. Press.

*** Latest editions of all the suggested books are recommended**

Semester-II
Waves & optics

Course Code: BAS220 **L T P C**
4 0 0 4

Objective: To understand the fundamentals of physics like geometrical optics & wave motion, electromagnetic theory, wave optics: diffraction, interferometer and holography etc.

Course Contents:

Unit-I **(8 Lectures)**

Geometrical optics: Fermat's principle, reflection and refraction at plane interface, Application to thick lenses, Ramsden and Huygens eyepiece.

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves, Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave.

Unit-II **(8 Lectures)**

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical methods. Lissajous Figures (1:1 and 1:2) and their uses. Superposition of N harmonic waves.

Interference: Division of amplitude and wavefront. Young's double slit experiment, Fresnel's Biprism. Interference in Thin Films: parallel and wedge-shaped films. Newton's Rings: Measurement of wavelength and refractive index.

Unit-III **(8 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front, Huygens's Principle. Temporal and Spatial Coherence. **Interferometer**: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

Unit-IV **(8 Lectures)**

Fraunhofer diffraction: Single slit, double slit & nth slits, Diffraction grating. Resolving Power of a telescope Resolving power of grating.

Holography: Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves.

Unit-V **(8 Lectures)**

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave, Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire.

Text & Reference Books:

1. Waves: Berkeley Physics Course, Francis Crawford, Tata McGraw-Hill. Fundamentals of Optics, F.A. Jenkins and H.E. White, McGraw-Hill.
2. Principles of Optics, Max Born and Emil Wolf, Pergamon Press. Optics, Ajoy Ghatak, Tata McGraw Hill.
3. Fundamental of Optics, A. Kumar, H.R. Gulati and D.R. Khanna, 2011, R. Chand Publications

*** Latest editions of all the suggested books are recommended**

Semester II
Fundamentals of Physical Chemistry

Course Code: BAS219	L	T	P	C
	4	0	0	4

Objective: The objective of this course to introduce the basic principles and methodologies of Physical chemistry, Clarity of concepts concerning Gaseous state, Phase rule, First law of thermodynamics etc. This course also provides the students an overview of the fundamental theories and application of Physical materials.

Unit – I **(8 Lectures)**

Gaseous state:

Postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path, including their temperature and pressure dependence. Behavior of real gases: Deviations from ideal gas behavior, compressibility factor, *Z*, Causes of deviation from ideal behavior. Van der Waals equation of state, its derivation and application in explaining real gas behavior, virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature.

Unit – II **(8 Lectures)**

Liquid state

Qualitative treatment of the structure of the liquid state; Radial distribution function; physical properties of liquids; vapor pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases.

Unit – III **(8 Lectures)**

Solid state

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; Bragg's law, Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Unit – IV **(8 Lectures)**

Ionic equilibria I

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di-and triprotic acids (exact treatment).

Unit – V **(8 Lectures)**

Ionic equilibria II

Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers . Solubility and solubility product of sparingly soluble salts – applications of solubility product principle, Theory of acid–base indicators; selection of indicators and their limitations.

Text & Reference Books:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 10th Ed., Oxford University Press.
2. Castellan, G. W. *Physical Chemistry* Narosa.
3. Mortimer, R. G. *Physical Chemistry* Elsevier: NOIDA, UP.
4. Engel, T. & Reid, P. *Physical Chemistry* Pearson.

*** Latest editions of all the suggested books are recommended**

Semester II
Environmental Studies

Course Code: BAS214/EAS115/BAS328/BAS428 **L T P C**
1 2 0 2

Objective: To create awareness among students about environment protection.

Course Content:

Unit I **(Lectures 08)**

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit II **(Lectures 08)**

Natural Resources: Renewable & Non-Renewable resources; Land resources and landuse change; Land degradation, Soil erosion & desertification. **Deforestation**: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources**: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies.

Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit III **(Lectures 08)**

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Unit IV **(Lectures 08)**

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V **(Lectures 08)**

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G. M., Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odem, E. P., W. B. Sannders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I.K. Publication

***Latest editions of all the suggested books are recommended.**

Semester II
English Communication and Soft Skills-II

Course Code: BHM249/EHM249 **L T P C**
1 1 2 2

Objectives:

1. To enhance the vocabulary of learners to address competitive exams like PGT & TGT.
2. To develop ability of sentence construction.
3. To enhance learner's writing ability.
4. To make the learner effective in presenting himself/herself.

Course Contents:

Unit – I Vocabulary & Grammar **(14 hours)**

- Homophones, Homonyms, Synonyms, Antonyms and one-word substitution.
- Parts of Speech, Modals, Tenses and Simple sentence construction.

Unit – II Listening Skills **(05 hours)**

- Difference between listening & hearing, Types of Listening, Process
- Importance and Barriers to listening

Unit – III Writing Skills **(08 hours)**

- Letters and Email writing
- Story Narration

Unit – IV Strategies & Structure of Presentation and Problem Sounds **(13 hours)**

- Managing Time, Audience & Locale, Structure and Organization of Content and 5 W's
- Problem Sounds: S- Sh, J-Z and V-B*

Reference Books:

1. Nesfield J.C. "*English Grammar Composition & Usage*" Macmillan Publishers
2. Sood Madan "*The Business letters"* Goodwill Publishing House, New Delhi
3. Kumar Sanjay & Pushplata "*Communication Skills*" Oxford University Press, New Delhi.

Methodologies:

1. Words and exercises, usage in sentences.
2. Sentence construction on daily activities and conversations.
3. Format and layout to be taught with the help of samples and preparing letters on different subjects.
4. JAM sessions and Picture presentation.
5. Tongue twisters, Newspaper reading and short movies.

Note:

- 3 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.
- Repeated practice of sound.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
40 Marks		60 Marks		100
30 Marks (Progressive Evaluation) After each unit-completion: Assignments / oral Presentation	10 Marks (Attendance)	20 Marks Midway external assessment (Oral Presentation) *	40 Marks (Written Examination)	

*** Parameters of Midway external assessment Oral Presentation**

Content	Pronunciation	Delivery of Content	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:

Midway Assessment*: To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be send to Examination Department.*

Written Examination*: There would be four questions with internal choice one from each unit of 10 marks.*

Semester-II
Electricity and Magnetism (Lab)

Course Code: BAS268 **L T P C**
0 0 3 2

Objective: To learn practically the various types of circuits, determination of low resistance and measurement of physical properties.

- **List of Experiments:**

Note: Select any ten experiments from the following list.

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Foster's Bridge.
5. To compare capacitances using De'Sauty's bridge.
6. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
7. To verify the Thevenin theorem.
8. To verify Norton theorem.
9. To determine self-inductance of a coil by Anderson's bridge.
10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, & Impedance at resonance,
11. To study response curve of a Series LCR circuit and determine its (a) Quality factor Q, & (b) Band width.
12. To study the response curve of a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. To determine self-inductance of a coil by Rayleigh's method.

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, , Heinemann Educational Publishers
4. Engineering Practical Physics, S.Panigrahi and B.Mallick, Cengage Learning.
5. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, Vani Pub

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-II
Waves & Optics (Lab)

Course Code: BAS266

L	T	P	C
0	0	3	2

Objective: To compute practically the various types of optical properties, study of various interference pattern, determination of refractive index and measurement of dispersive power of grating.

List of Experiments:
Note: Select any ten experiments from the following list.

1. To determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2– T law.
2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster`s focusing; determination of angle of prism.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine the wavelength of sodium source using Michelson's interferometer.
8. To determine wavelength of sodium light using Fresnel Bi-prism.
9. To determine wavelength of sodium light using Newton's Rings.
10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced by a wedge-shaped Film.
11. To determine wavelength of (1) Na source or (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, Kitab Mahal.
3. Advanced level Physics Practical, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P. Khandelwal, Vani Pub.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-II
Fundamentals of Physical Chemistry (Lab)

Course Code: BAS269 **L T P C**
0 0 3 2

Objective: To learn the various types of reactions via practically, chemical kinetics properties and determination of heat capacity, enthalpy and surface tension.

List of experiments

1. Determination of heat capacity of calorimeter for different volumes.
2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
3. Determination of enthalpy of ionization of acetic acid.
4. Determination of integral enthalpy of solution of salts (KNO3, NH4Cl).
5. Determination of enthalpy of hydration of copper sulphate.
6. Determination of the surface tension of a liquid or a dilute solution using a stalagmometer.
7. Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer.
8. Chemical Kinetics Study the kinetics of the following reactions.
   a). Initial rate method: Iodide-persulphate reaction
   b). Integrated rate method:
9. Acid hydrolysis of methyl acetate with hydrochloric acid.

Text & Reference Books

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
3. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP211

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester-III
Elements of Modern Physics

Course Code: BAS314 **L T P C**
4 0 0 4

Objective: To learn basics of modern Physics, Planck's quantum and fundamental of quantum relations.

Course Contents:

Unit-I **(08 Lectures)**

Planck's quantum-I: Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves. Two-Slit experiment with electrons.

Unit-II **(08 Lectures)**

Planck's quantum-II: Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles

Unit-III **(08 Lectures)**

Schrodinger Equations: Schrodinger equations, Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force

Unit-IV **(08 Lectures)**

Fission and fusion: Mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Fusion and thermonuclear reactions driving stellar energy.

Unit-V **(08 Lectures)**

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.

Reference Books:

1. Concepts of Modern Physics, Arthur Beiser, McGraw-Hill.
2. Introduction to Quantum Mechanics, David J. Griffith, Pearson Education.
3. Physics for scientists and Engineers with Modern Physics, Jewett and Serway, Cengage Learning.
4. Modern Physics, G.Kaur and G.R. Pickrell, McGraw Hill.

5. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, Macmillan.
6. Theory and Problems of Modern Physics, Schaum`s outline, R. Gautreau and W. Savin, Tata McGraw-Hill Publishing Co. Ltd.
7. Six Ideas that Shaped Physics: Particle Behave like Waves, T. A. Moore, McGraw Hill.

*** Latest editions of all the suggested books are recommended**

Semester-III
Mathematical Physics- II

Course Code: BAS318 **L T P C**
4 0 0 4

Objective: To learn Fourier series, Frobenius method, theory of errors and special functions.

Course Content

Unit-I **(08 Lectures)**

Fourier Series:

Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Even and odd functions and their Fourier expansions.

Unit-II **(08 Lectures)**

Power series and Frobenius Method:

Ordinary points, Power series metod, Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations.

Unit-III **(08 Lectures)**

Special Functions:

Legendre, Bessel and Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Bessel Generating Function, simple recurrence relations. Zeros of Bessel Functions $J_o(x)$ and J1(x)) and Orthogonality, Hermite Polynomials (without proof).

Unit-IV **(08 Lectures)**

Some Special Integral & Theory of Errors:

Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function, Random Errors. Propagation of Errors. Standard and Probable Error. Least-squares fit (straight line).

Unit-V **(08 Lectures)**

Partial Differential Equations:

Classification of partial differential equation. Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular. Diffusion Equation.

Text & Reference Books:

1. Mathematical Methods for Physicists: Arfken, Weber, Harris, Elsevier. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
2. Mathematics for Physicists, Susan M. Lea, Thomson Brooks/Cole. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
3. Partial Differential Equations for Scientists & Engineers, S.J. Farlow,Dover Pub. Engineering Mathematics, S.Pal and S.C. Bhunia, Oxford University Press
4. Mathematical methods for Scientists & Engineers, D.A. McQuarrie,Viva Books

*** Latest editions of all the suggested books are recommended**

Semester-III
Thermal Physics

Course Code: BAS320 **L T P C**
4 0 0 4

Objective: To learn laws of thermodynamics, entropy, and Maxwell's thermodynamic relations.

1. Course Content

Unit-I **(08 Lectures)**

Introduction to Thermodynamics:

Zeroth, First & Second Law of Thermodynamics: Thermodynamic Variables & Equilibrium, Concept of Temperature, Work & Heat, Internal Energy, Applications of First Law: General Relation between C_P and C_V, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient. Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Carnot's Cycle, Carnot engine & efficiency. Applications of Second Law of Thermodynamics.

Unit-II **(08 Lectures)**

Entropy & Thermodynamic Potentials:

Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Principle of Increase of Entropy. Temperature–Entropy diagrams. Third Law of Thermodynamics. Thermodynamic Potentials, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations

Unit-III **(08 Lectures)**

Maxwell's Thermodynamic Relations:

Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation, (2) Values of C_p-$C_{v,}$(3) TdS Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process.

Unit-IV **(08 Lectures)**

Kinetic Theory of Gases-Distribution of Velocities, Molecular Collisions:

Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases, Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian motion and its Significance.

Unit-V **(08 Lectures)**

Real Gases:

Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. P-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule-Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule-Thomson Cooling.

Text & Reference Books:

1. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, McGraw-Hill. A Treatise on Heat, Meghnad Saha, and B. N. Srivastava, Indian Press
2. Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, Tata McGraw-HillModern Thermodynamics with Statistical Mechanics, Carl S. Helrich, Springer.
3. Thermodynamics, Kinetic Theory & Statistical Thermodynamics, Sears & Salinger. Narosa.
4. Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell, Oxford University Press
5. Thermal Physics, A. Kumar and S.P. Taneja, R. Chand Publications.

*** Latest editions of all the suggested books are recommended.**

Semester-III
Fundamentals of Organic Chemistry

Course Code: BAS321 **L T P C**
4 0 0 4

Objective: To learn the various types of reactions, rearrangements and their synthetic utility and Concept of isomerism, Alcohols and Organometallic Compounds.

Course Content:

Unit – I **(08 Lectures)**

Basics of Organic Chemistry I:

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties.

Electronic Displacements: Inductive, electrometric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength.

Unit – II **(08 Lectures)**

Basics of Organic Chemistry II:

Homolytic and Heterolytic fission. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophlicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes.

Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions. Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity.

Unit – III **(08 Lectures)**

Chemistry of Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic bromination and mechanism, e.g. propene, 1-butene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Unit – IV **(08 Lectures)**

Stereochemistry:

Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules.

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Distereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations.

Unit – V **(08 Lectures)**

Aromatic Hydrocarbons:

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.

Text & Reference Books:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International.
5. McMurry, J.E. Fundamentals of Organic Chemistry, Cengage Learning India Edition.

*** Latest editions of all the suggested books are recommended**

Semester-III
English Communication and Soft Skills-III

[BHM349/EHM349/449 amended vide approval dt. July 23, 2018 of V.C]

Course Code: BHM349/EHM349/449 **L T P C**
1 1 2 2

Objectives:

1. To enable the learners to upgrade their knowledge of grammar and vocabulary to address competitive exams like GATE.
2. To enable the learner to improve their listening.
3. To enable the learners to improvise their voice modulation in reading and speaking.
4. To enable the learners to enhance their writing and comprehensive skills in English
5. To enable the learners to proactively participate in activities in situational context.

Course Contents:

Unit – I Grammar & Vocabulary (14 hours)

- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Transformation of sentences
- Commonly used Idiom & Phrases (Progressive learning whole semester)

Unit – II Essence of Effective listening & speaking (12 hours)

- Listening short conversation/ recording (TED talks / Speeches by eminent personalities) *Critical Review of these abovementioned*
- Voice Modulation: Five P's - Pace, Power, Pronunciation, Pause, and Pitch.
- Impromptu
- Power Point Presentation (PPt) Skills**:** Nuances of presenting PPTs

Unit – III Reading and Comprehension Skills (08 hours)

- Strategies of Reading comprehension: Four S's
- How to solve a Comprehension (Short unseen passage: 150-200 words)
- Reading Newspaper (Progressive learning whole semester)

Unit – IV Writing Skills (06 hours)

- Essentials of a paragraph
- Paragraph writing (100-120 words)

Reference Books:

1. Allen, W. *"Living English Structure*" Pearson Education, New Delhi.
2. Joseph, Dr C.J. & Myall E.G. "*A Comprehensive Grammar of Current English*" Inter University Press, Delhi
3. Wren & Martin "*High School English Grammar and Composition*" S.Chand & Co. Ltd., New Delhi.
4. Norman Lewis "*Word Power Made Easy*" Goyal Publications & Distributers, New Delhi.
5. Chaudhary, Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi.
6. Kumar Sanjay & Pushplata "*Communication Skills*" Oxford University Press, New Delhi.
7. Agrawal, Malti "*Professional Communication*" Krishana Prakashan Media (P) Ltd. Meerut.

Methodologies:

1. Idiom & Phrases and exercises, usage in sentences.
2. Sentence transformation on daily activities and conversations.
3. Power Point presentation.
4. Newspaper reading, short articles from newspaper to comprehend and short movies.

Note:

- For effective communication practice, groups will be changed weekly
- Class (above 30 students) will be divided in to two groups for effective teaching.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
40 Marks		60 Marks		100
30 Marks (Progressive Evaluation) After each unit-completion: Assignments / PPt Presentation *(Best three assignments)*	10 Marks (Attendance)	20 Marks Midway external assessment (viva) *	40 Marks (Written Examination)	

Note: *Midway external assessment of 20 marks will be submitted and consider with external evaluation with a total of 60 marks.*

*** Parameters of Midway external assessment Viva**

Content	Voice Modulation	Body Language	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:

Midway Assessment*: To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be sent to Examination Department.*

Written Examination*: There will be questions only from Unit-I, III & IV*

Semester III

Database Management System

Course Code: BCS311/ECS611/411/511/MSC014	L	T	P	C
	3	1	0	4

Objective: Introducing the fundamental concepts necessary for designing, using, and implementing database systems and applications. The goal of this course is for students to become well-grounded in basic concepts necessary for understanding DB and their users, DBMS concepts, architecture, the concepts of the Entity Relationship(ER) model, the data abstraction and semantic modeling concepts leading to EER data model, describe the basic relational model, its integrity constraints and update operations, and the operation of relational algebra, describe relational schema design, and it covers the normalization and functional dependency algorithm.

Course Contents:

Unit I: **(Lectures 08)**

Introduction: Scope and purpose of database system, view of data, relational databases, database architecture, transaction management, database system Vs filesystem, Database system concept and architecture, data definitions language, DML.

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction

Unit II: **(Lectures 08)**

Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity etc, Codd's rules, Relational Schemas, Introduction to UML, Relational database model: Logical view of data, keys, integrity rules.

Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF)

Unit III: **(Lectures 08)**

Relational data Model and Language: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, Relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, Computational capabilities, constraints, Views.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, and Procedures in SQL/PL SQL.

Unit IV: **(Lectures 08)**

Usage of Oracle:

1. Installing oracle
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE
4. MYSQL: a) Writing basic SQL SELECT statements.
   b) Restricting and sorting data.
   c) Displaying data from multiple tables.
   d) Aggregating data using group function.
   e) Manipulating data.
   f) Creating and managing tables.
5. Normalization in ORACLE.
6. Creating cursor in oracle.
7. Creating procedure and functions in oracle.
8. Creating packages and triggers in oracle.

Unit V: **(Lectures 08)**

Transaction management: ACID properties, serializability and concurrency control Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Text Books:

1. Elmasri, R., Navathe, S., Fundamentals of Database Systems, Addison-Wesley.
2. G. K. Gupta, "Data Base Management", Tata Mc Graw Hill.
3. Atul Kahate, "Introduction to Database Management Systems" Pearson Education, New Delhi, 2006.

***Latest editions of all the suggested books are recommended.**

Semester-III
Elements of Modern Physics (Lab)

Course Code: BAS364

L	T	P	C
0	0	3	2

Objective: To learn and understand the laws of modern Physics and fundamental of their relations practically.

List of Experiments:

Note: Select any ten experiments from the following list.

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light.
3. To determine work function of material of filament of directly heated vacuum diode.
4. To determine the Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the ionization potential of mercury.
7. To determine the absorption lines in the rotational spectrum of Iodine vapour.
8. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To show the tunneling effect in tunnel diode using I-V characteristics.
11. To determine the wavelength of laser source using diffraction of single slit.
12. To determine the wavelength of laser source using diffraction of double slits.
13. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop,Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, , Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, Kitab Mahal.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-III
Thermal Physics (Lab)

Course Code: BAS365

L	T	P	C
0	0	3	2

Objective: To learn and understand the laws of thermal Physics and fundamental of their relations practically.

List of Experiments:

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
3. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
6. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
7. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method, (2) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature.

Text & Reference Books

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-III
Fundamentals of Organic Chemistry (Lab)

Course Code: BAS366

L	T	P	C
0	0	3	2

Objective: To learn the practical knowledge of various types of reactions, rearrangements and their synthetic utility.

List of Experiments

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)
2. Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.
3. Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
   - **(a)** Bromination of Phenol/Aniline
   - **(b)** Benzoylation of amines/phenols
   - **(c)** Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

Text & Reference Books:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson.
3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall.
4. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP311 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester-IV
Mathematical Physics-III

Course Code: BAS420 **L T P C**
4 0 0 4

Objective: The emphasis of the course is on applications in solving problems of interest to physicists. Students are to be examined on the basis of problems, seen and unseen.

Course Content

Unit-I **(08 Lectures)**

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Milnes-Thomson method.

Unit-II **(08 Lectures)**

Singular functions: Poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral Theorem, Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals.

Unit-III **(08 Lectures)**

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform.

Unit-IV **(08 Lectures)**

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of 1^{st} and 2^{nd} order Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions.

Unit-V **(08 Lectures)**

Convolution Theorem: Inverse LT. Application of Laplace Transforms to 2^{nd} order Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits, Coupled differential equations of 1^{st} order. Solution of heat flow along infinite bar using Laplace transform.

Text & Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, Cambridge University Press.

2. Mathematics for Physicists, P. Dennery and A. Krzywicki, Dover Publications Complex Variables, A. S. Fokas & M. J. Ablowitz, Cambridge Univ. Press Complex Variables, A.K. Kapoor, Cambridge Univ. Press.
3. Complex Variables and Applications, J.W. Brown & R.V. Churchill, Tata McGraw-Hill.
4. First course in complex analysis with applications, D.G. Zill and P.D. Shanahan, Jones & Bartlett.

*** Latest editions of all the suggested books are recommended**

Semester-IV
Semiconductor Physics

Course Code: BAS421 **L T P C**
4 0 0 4

Objective: The aim of the course is to develop physics and engineering strategies of semiconductor materials and to discuss their functionalities in modern electronic and optoelectronic devices.

Course Content:

UNIT-I **(08 Lectures)**

Introduction to solid state materials:

Crystal structure - Reciprocal lattice - Brillouin zone and rules for band (k - space) representation. Dynamics of electrons in periodic potential: Kronig - penny and nearly free electron models - Real methods for band structure calculations; Bandgaps in semiconductors - Holes and effective mass concept - Properties of conduction and valance bands.

UNIT-II **(08 Lectures)**

Fermi distribution and energy: Density of states (DOS) - Valance and conduction band density of states - intrinsic carrier concentration – intrinsic Fermi level. Extrinsic semiconductors: n and p type doping - Densities of carriers in extrinsic semiconductors and their temperature dependence - extrinsic semiconductor Fermi energy level - Degenerate and non - degenerate semiconductors - Bandgap engineering.

UNIT-III **(08 Lectures)**

Scattering Mechanism: electron - electron and electron - phonon scattering. Macroscopic transport: Carrier transport by Diffusion - Carrier transport by Drift: Low field, High field and very high field (Impact ionization) - Einstein relation.

UNIT-IV **(08 Lectures)**

Electron - hole pair generation and recombination: band to band (direct and indirect band gap transitions) and intra band (impurity related) transitions, free - carrier & phonon transitions. Excitons: Origin, electronic levels and properties Radiative and non-radiative recombination (Shockley - Read - Hall and Auger) processes. Carrier transport - continuity equations.

UNIT-V **(08 Lectures)**

Processing of Semiconductor devices (Brief), p – n, Semiconductor junctions - Homo and hetero Junctions. Semiconductors Quantum structures, Density of states and excitons, Semiconductor photonic structures: 1D, 2D and 3D photonic crystals. Active and passive optoelectronic devices: performance and response enhancement (photo processes).

Text & Reference Books:

1. "The Physics of Semiconductors" by Kevin F Brennan, Cambridge University Press.
2. "Fundamentals of Semiconductors" by Peter Y Yu and Manuel Cardona, Spriger.
3. "Introduction to Solid State Physics" by Charles Kittel, Willey.
4. "Semiconductor Physics and Devices" by D.A. Neamen, Tata McGraw-Hill.
5. "Physics of Semiconductor Devices" S. M. Sze, John Willey.
6. "Semiconductor Optoelectronics (Physics and Technology)", Jasprit Singh, McGraw-Hill.

*** Latest editions of all the suggested books are recommended**

Semester-IV
Atomic & Molecular Physics

Course Code: BAS422 **L T P C**
4 0 0 4

Objective To provide a framework of understanding physics of atom and molecules, origin of X-Rays, Spectroscopic notation, rotational and vibrational spectra, Basics knowledge of Raman Spectra etc.

Course Contents:

Unit-I **(Lectures 08)**

Determination of e/m of the Electron, Thermionic Emission, Isotopes and Isobars, X-rays: Ionizing Power, X-ray Diffraction, Bragg's Law. Bohr Atomic Model, Critical Potentials, X-rays-Spectra: Continuous and Characteristic X-rays, Moseley Law.

Unit-II **(Lectures 08)**

Atoms in Electric and Magnetic Fields: Electron Angular Momentum, Space Quantization, Electron Spin and Spin Angular Momentum, Larmor's Theorem. Spin Magnetic Moment, Stern-Gerlach Experiment, Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton, Zeeman Effect, Paschen Back and Stark Effect

Unit-III **(Lectures 08)**

Many electron atoms: Pauli's Exclusion Principle, Symmetric and Antisymmetric Wave Functions, Periodic table. Fine structure, Spin orbit coupling, Spectral Notations for Atomic States, Total Angular Momentum, Vector Model, L-S and J-J couplings, Hund's Rule, Term symbols, Spectra of Hydrogen and Alkali Atoms (Na etc.).

Unit-IV **(Lectures 08)**

Molecular Spectra: Rotational Energy levels, Selection Rules and Pure Rotational Spectra of a Molecule, Vibrational Energy Levels, Selection Rules and Vibration Spectra, Rotation-Vibration Energy Levels, Selection Rules and Rotation-Vibration Spectra, Determination of Internuclear Distance.

Unit V **(Lectures 08)**

Raman Effect: Quantum Theory of Raman Effect, Characteristics of Raman Lines, Stoke's and Anti-Stoke's Lines, Complimentary Character of Raman and infrared Spectra.

Text Books:

1. Concepts of Modern Physics by Arthur Beiser (McGraw-Hill Book Company.
2. Atomic physics by J. B. Rajam & foreword by Louis De Broglie, S. Chand & Co.
3. Atomic Physics by J.H.Fewkes & John Yarwood., Oxford Univ. Press.

Reference Books:

1. Physics of Atoms and Molecules, Bransden and Joachein.
2. Molecular Spectroscopy, Banwell.
3. Optoelectronics by Ghatak and Thyagarajan
4. Principles of Lasers by Svelto

*** Latest editions of all the suggested books are recommended**

Semester-IV
Material Science

Course Code: BAS423 **L T P C**
4 0 0 4

Objective: To provide knowledge of internal structure of material, various defects that present in the structure of materials. microscopes and preparation of samples, phase diagram and Equilibrium diagram, phenomenon of transformations. different elastic properties visco-elastic behavior of polymers.

Course Contents:

Unit-I **(Lectures 08)**

Internal Structure of Materials: Atomic basis of structure – ionic bonding, Covalent bonding, Metallic bonding, Secondary bonding. Crystalline and non-crystalline states, Crystal symmetry, Metal Structures, Ionic and Covalent Structures, Silica and silicates, Polymers, Fullerenes, Experimental methods for structural determination: x-ray and neutron diffraction.

Unit-II **(Lectures 08)**

Crystal Imperfections: Point, line, surface and volume imperfections, dislocations and their geometry, Disorder in polymers and non-crystalline materials.

Unit-III **(Lectures 08)**

Phase Diagrams: Phase rule, Single component systems, Binary phase diagrams, Lever rule, phases in polymers, non-crystalline and crystalline phases. Non-equilibrium in phase diagrams, Cu-Zn system, Fe- C alloys, Ceramic Systems, Other applications of phase diagrams.

Unit-IV **(Lectures 08)**

Phase Transformations: Time scale for phase changes, Nucleation kinetics, Growth of nuclei and solidification of alloys, Transformations in steel, Precipitation processes, Glass Transition; Recovery, re-crystallization and grain growth.

Unit-V **(Lectures 08)**

Elastic Properties: Elastic behavior and its atomic model, Rubber like elasticity, inelastic behavior, Relaxation processes, Visco-elastic behavior, and spring dash pot model, Plastic deformation.

Text Books:

1. Introduction to Solid State Physics: C. Kittel, wiley.
2. Introduction to Solids: L.V. Azaroff, Tata McGraw Hill.
3. Solid State Physics: A. J. Dekker, Prentice-Hall.

Reference Books:

1. Essentials of Materials Science: A.G. Guy, McGraw Hill.
2. Materials Science and Engineering: V. Raghvan, Prentice Hall.
3. Elements of Materials Science and Engineering: L.H. Van Vlack, Wesley.

*** Latest editions of all the suggested books are recommended**

Semester IV

English Communication and Soft Skills – IV

[BHM499/EHM599/699 amended vide approval dt. July 23, 2018 of V.C]

Course Code: BHM499/EHM599/699 **L T P C**
1 1 2 2

Objectives:

1. To enable the learners to inculcate the skills of technical writing.
2. To enable the learners to proactively participate in Job Oriented activities.
3. To enable the learners to be aware of corporate Skills.

Course Contents:

Unit – I: Job Oriented Skills **(10 Hours)**

- Cover Letter
- Preparing Resume and Curriculum-Vitae
- Writing Joining Report

Unit – II: Technical Communication **(12 Hours)**

- Technical description of engineering objects
- Data Interpretation: Tables, Charts, & Graphs
- Preparing Agenda & Minutes of the Meeting
- Technical Proposal: Types, Significance, Structure & AIDA
- Report Writing: Types, Structure& Steps towards Report writing

Unit- III: Interview Skills **(10 Hours)**

- Branding yourself
- Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
- Group Discussion: Do's and Don'ts of Group Discussion
- Negotiation skills

Unit – IV: Corporate Skills **(8 Hours)**

- Corporate Expectation
- Service mindset: Selling a product - Ad made shows
- Goal setting
- Team Building & Leadership
- Professional Ethics

Reference Books:

- Raman Meenakshi & Sharma Sangeeta, *"Technical Communication-Principles & Practice"* Oxford University Press, New Delhi.
- Mohan K. & Sharma R.C., "*Business Correspondence of Report Writing",* TMH, New Delhi.
- Chaudhary, Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi.
- Kumar Sanjay & Pushplata "*Communication Skills*" Oxford University Press, New Delhi.
- Agrawal, Malti "*Professional Communication*" Krishana Prakashan Media (P) Ltd. Meerut.

Methodology:

1. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
2. Conversational Practice will be effectively carried out by Face to Face & Via Media (Audio-Video Clips)
3. Modern Teaching tools (PPT Presentation & Motivational videos with sub-titles) will be utilized.

Note:

- For effective communication practice, groups will be changed weekly.
- Class (above 30 students) will be divided in to two groups for effective teaching.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
50 Marks		50 Marks		100
40 Marks (Progressive Evaluation) After each unit-completion: Assignments /Oral Presentation	10 Marks (Attendance)	25 Marks Midway external assessment (Viva) *	25 Marks (External Viva)* *	

Note: 1. *Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.*
2. Assignments & Oral Presentation (Progressive Evaluation) will be designed to test learning outcomes unit wise.

*Parameters of Midway external assessment (Viva)

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	Voice Modulation	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note*: To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.*

**Parameters of External Viva

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	Voice Modulation	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: *External Viva will be conducted by 3-member committee comprising*

a) *Faculty teaching the class*
b) *English faculty from other college of the University (As approved by VC).*
c) *T&P officer of other colleges of the University (As approved by VC).*

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.

Semester IV
Design and Installation of Solar Photovoltaic System

Course Code: BAS464/EEC762 **L T P C**
0 2 2 2

Objective: To learn students-

- Basics of solar energy
- Installation, Maintenance and Service of solar power plant.
- Designing in AutoCAD
- Risk Management and to ensure safety and performance.

Course Contents:

Unit-1 **(T Hrs-4.5, P Hrs - 3.5)**

Basics of PV Technology: What is Solar Energy, Solar Collectors, Photovoltaic Systems, History of Photovoltaics, Photovoltaic Effect, Photovoltaic Cells, PV Modules and Arrays.

Solar PV technology overview: How does PV technology work, Other Types of Photovoltaic Technology, Costs of Solar Photovoltaics, Modern Photovoltaics.

Fundamentals of Solar Components Solar PV System: Solar Radiation, Solar Cell Parameters and Equivalent Circuit, Losses and Efficiency Limits, Crystalline Silicon Solar Cells, Thin-film solar cells, PV System Design.

Site survey, assessment & feasibility study: PV Site Location, Assumptions and Input Data for Analysis, Potential Rate Increases, Conclusions and Recommendations.

Unit-2 **(T Hrs-4, P Hrs -5)**

Assess the customer's Solar PV requirement: pv cost considerations, permits and covenants, stand-alone small solar electric systems, grid-connected small solar electric systems, estimating energy cost savings for net-metered pv system.

Capacity or system sizing approach: Solar PV system sizing, determine power consumption demands, Inverter sizing, Battery sizing, available area for installation of SPV.

Design of SPV Plants: Load estimation, Estimation of number of PV panels, Estimation of battery bank, Cost estimation of the system.

Unit-3 **(T Hrs-4, P Hrs -5)**

Preparation of Bill of Materials (BoM): Mechanical or electrical components used to assemble or integrate major components, Size of the Plant, Type of Roof, Module Make and Specs, Inverter Make and Specs, Whether Remote Monitoring is separately required.

Installation, Maintenance and Service of SPV Plants: Modularity & scalability, Flexible location.

Civil and Mechanical parts of Solar PV System: Get Equipment Foundation constructed, Install Mounting System, Install Photovoltaic modules, Install Battery Bank Stand and Inverter Stand.

Unit-4 **(T Hrs-6, P Hrs -5)**

Electrical components of Solar PV System: Install Array JB, cost effective wiring, Using MCCBs and other essential components.

Advanced Solar Power plant Engineering: Photovoltaic Inverter Topologies for Grid Integration Applications, Advanced Control Techniques for PV Maximum Power Point Tracking, Maximum Power Point Tracking Methods for PV Systems, Photovoltaic Multiple Peaks Power Tracking Using Particle, Swarm Optimization with Artificial Neural Network Algorithm

Intro – Google Sketchup, PV Syst, AutoCAD: Creation of a grid-connected project, Construction and use of 3D shadings scenes, Meteorological data in PV-syst.

Unit-5 **(T Hrs-7, P Hrs -1)**

Solar project development phases and issues: Initiation phase, Definition phase, Design phase, Development phase, Implementation phase, Follow-up phase.

Project planning and schedule of activities: Management activities**,** Project planning, Project scheduling, Risk management, Risk identification, Risk analysis, Risk planning, Risk monitoring

Best practices in design & installation to ensure safety and performance: Work History, Financial Transparency, Health and Safety, Insurance.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment (Min. 06 experiment) would be evaluated by external trainer or by faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by external trainer or the faculty concerned. The marks shall be entered on the index sheet of the practical file. Each experiment will be evaluated in 5 marks as per given distribution.

Evaluation scheme:

S. No.	Experiment (10 marks)	Attendance (10 marks)	Test result (20 marks)	Viva (10 MARKS)	Average in 5 Marks
Experiment 1					
Experiment 2					
:					
Experiment 10					

External Evaluation (50 marks)

The external evaluation would also be done by the external trainer or industrial expert or by faculty based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP411 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester-V
Electromagnetic Theory

Course Code: BAS520 **L T P C**
4 0 0 4

Objective: To learn laws of EM theory; e.g. Maxwell's equations, wave propagation in unbounded media and bounded media, polarization of EM waves, waveguides and optical fibers.

Course Contents:

Unit I **(Lectures 08)**

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge, Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density.

Unit II **(Lectures 08)**

EM Wave Propagation in Unbounded Media: Wave Equations, Transverse nature of plane EM waves Plane EM waves through vacuum and isotropic dielectric medium, refractive index and dielectric constant, wave impedance. Propagation through conducting media, skin depth.

Unit III **(Lectures 08)**

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection.

Unit IV **(Lectures 08)**

Polarization of Electromagnetic Waves: Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Analysis of Polarized Light.

Unit V **(Lectures 08)**

Optical Wave Guides: Planar optical wave guides. Condition of continuity at interface. Propagation of TE & TM modes in symmetrical wave guides. Eigen value equation. Phase shift on total reflection.

Text & Reference Books:

1. Introduction to Electrodynamics, D.J. Griffiths, Benjamin Cummings. Elements of Electromagnetics, M.N.O. Sadiku, Oxford University Press.
2. Introduction to Electromagnetic Theory, T.L. Chow, Jones & Bartlett Learning Fundamentals of Electromagnetics, M.A.W. Miah, Tata McGraw Hill.
3. Electromagnetic field Theory, R.S. Kshetrimayun, Cengage Learning.
4. Engineering Electromagnetic, Willian H. Hayt, McGraw Hill.
5. Electromagnetic Field Theory for Engineers & Physicists, G. Lehner, Springer.

*** Latest editions of all the suggested books are recommended**

Semester-V
Laser Physics

Course Code: BAS521 **L T P C**

4 0 0 4

Objective: The objective the course is to provide advanced learning of laser and its application in various areas of science technology research medicine.

Course Contents:

Unit I **(08 Lectures)**

Basic Principle of Laser, Einstein Coefficients, condition for Light Amplification- Population Inversion, threshold condition, Laser Rate Equations-two, three and four level systems.

Unit II **(08 Lectures)**

Laser power around threshold, optimum output coupling, Line Broadening Mechanisms – Natural, Collision and Doppler, Optical Resonators – Modes of a rectangular cavity and open planar resonator, Modes of a Con-focal resonator system, General Spherical resonator, Higher order modes.

Unit III **(08 Lectures)**

Principle of Q-switching, different methods of Q-switching, electro-optic Q-switching, and mode locking Laser Beam Propagation: Laser beam propagation, properties of Gaussian beam, Gaussian beam focusing

UNIT-IV **(08 Lectures)**

Types of Lasers: Solid State lasers - Ruby and Nd-YAG Laser; Gas lasers - He-Ne and CO_2 lasers; semiconductor lasers - Liquid Dye lasers

UNIT-V **(08 Lectures)**

Application of laser: Application of laser in industry - cutting and welding - Drilling - surface Hardening - Medical applications - laser as diagnostic and therapeutic tool - Holography - Theory of recording and reconstruction - application of Holography.

Text and References Books:

1. Lasers and Non-linear optics. By- B. B. Laud.
2. LASERS- Theory and Applications, by- Thyagarajan and A. K. Ghatak.
3. Optics and LASER, by- V. K. Sewane
4. Introduction to Lasers, by- Dr. Avadhanulu, Dr. P. S. Hemne, Publisher: S. Chand & Company Ltd. New Delhi.

*** Latest editions of all the suggested books are recommended**

Semester-V
Classical Mechanics

Course Code: BAS522 **L T P C**
4 0 0 4

Objective: To study systems of particles; Calculus of Variation, Lagrange's equation for non-holonomic systems, Virial theorem, Generalized Notations, Atwood's machine & Twin Paradox.

Course Contents:

Unit I **(08 Lectures)**

System of particles, Constraints, Generalized coordinates, Velocity, acceleration and momentum and force, D'Alemberts principle and Lagrange's equation, Velocity dependent potential of electro-magnetic field.

Unit II **(08 Lectures)**

Calculus of Variation, Hamilton's principle, Lagrange's equation, Lagrangian for simple systems, Linear Harmonic oscillator, Simple pendulum, Atwood's machine. Cyclic coordinates symmetries and conservation laws.

Unit III **(08 Lectures)**

Basic concepts of Classical mechanics: Lagrange's undetermined multipliers, Lagrange's equation for non-holonomic systems, Virial theorem, Principle of mechanical similarity, Legendre transformations and Hamilton's equations of motion, Hamiltonian for a charge particle in Electro-magnetic field, Hamilton equation for simple system

Unit IV **(08 Lectures)**

Generalized Notations-I: Poisson Brackets, Jacobi Identity, Canonical transformation Hamilton-Jacobi theory, Action-Angle variables, related problems.

Unit V **(08 Lectures)**

Generalized Notations-II: Two body central force problem, reduction to the equivalent one body problem Differential equation for the orbit and integrable power law potentials, Condition for stable circular orbit, Kepler problems

Text and References Books:

1. Classical Mechanics: H. Goldstein.
2. Mechanics: L. D. Landau and E. M. Lifshitz
3. Introduction to Classical Mechanics: R. G. Takwale and Puranik.
4. Classical Mechanics of Particles and Rigid Bodies: K. C. Gupta.

*** Latest editions of all the suggested books are recommended**

Semester-V
Quantum Mechanics

Course Code: BAS523 **L T P C**
4 0 0 4

Objective: To study origin of quantum theory through described experiments-mechanism, Uncertainty principle & Operators and its use, application of Schrödinger equation like, electron sharing in covalent bonds, fusion in the sun, cold emission, scanning tunneling microscope & indistinguishability in quantum mechanics, bosons and fermions.

Course Contents:

Unit-I **(08 Lectures)**

Origin of quantum theory: Davisson-Germer experiments, wave-particle duality for photons and material particles, wave function and its Born interpretation, relation with measurement of dynamical variables, delta-function as definite position and plane wave as definite momentum wave function, wave packet as superposition of delta-functions and of plane waves.

Unit-II **(08 Lectures)**

Uncertainty principle & Operators: Position-momentum uncertainty principle, time energy uncertainty; Gaussian wave packets, applicability of classical physics on the basis of uncertainty product, operator formulation, commuting operators, simultaneous Eigen-functions, degenerate eigenfunctions, Schrödinger equation for time evolution.

Unit-III **(08 Lectures)**

Application of Schrödinger equation-I: Square well potentials, practical examples like metal-vacuum interface, contact potential between metals, bilayer and sandwiched, thin film etc., bound states in deep potential well and finite potential well, double, well potentials, delta function potentials and examples like electron sharing in covalent bonds.

Unit-IV **(08 Lectures)**

Application of Schrödinger equation-II: Linear harmonic oscillator, outline of getting stationary states, molecular vibrations and spectroscopy, barrier tunneling, examples of alpha-decay, nuclear fission, fusion in the sun.

Unit-V **(08 Lectures)**

Application of Schrödinger Equation-III: Angular momentum operators, its eigenvalues and eigenfunctions, spin angular momentum, hydrogen atom using coulomb interaction. Identical particles, indistinguishability in quantum mechanics, bosons and fermions.

Text and References Books:

1. Quantum Physics: S. Gasiorowicz.
2. Quantum Mechanics: B. H. Bransden and C. J. Joachain.
3. Quantum Physics of Atoms, Molecules, Nuclei and Solids: R. M. Eisberg and R. Resnick.
4. Quantum Mechanics: V. Devanathan.
5. Quantum Mechanics: C. S. Chaddha

*** Latest editions of all the suggested books are recommended**

Semester-V
Solid State Physics

Course Code: BAS524 **L T P C**
4 0 0 4

Objective: To study physical properties of crystal structure like, lattice translation vectors, lattice with a basis unit cell, Miller Indices, reciprocal lattice, elementary of lattice dynamics, magnetic, dielectric and ferroelectric properties of matter, superconductivity and elementary band theory etc.

Course Contents:

Unit I **(08 Lectures)**

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice: Translation Vectors, Lattice with a Basis Unit Cell, Miller Indices, Reciprocal Lattice, Types of Lattices, Brillouin Zones. Diffraction of X-rays by Crystals, Bragg's Law.

Unit II **(08 Lectures)**

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains; Acoustical and Optical Phonons, Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids; T^3 law.

Unit III **(08 Lectures)**

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia and Paramagnetic Domains. Quantum Mechanical Treatment of Para magnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.

Unit IV **(08 Lectures)**

Dielectric and Ferroelectric Properties of Materials: Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Langevin-Debye equation. Plasma Oscillations, Plasma Frequency, Plasmons, Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop.

Unit V **(08 Lectures)**

Superconductivity and Elementary band theory: Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration

Depth. Isotope effect. Idea of BCS theory (theoretically) Kronig Penny model. Band Gap, Conductor, Semiconductor (P and N type) and insulator. Hall Effect, Measurement of conductivity (four probe method) & Hall coefficient.

Text and References Books:

1. Introduction to Solid State Physics, Charles Kittel, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, Prentice-Hall of India.
3. Introduction to Solids, Leonid V. Azaroff, Tata Mc-Graw Hill.
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, Cengage Learning Solid-state Physics, H. Ibach and H. Luth, Springer.
5. Solid State Physics, Rita John, McGraw Hill.
6. Elementary Solid-State Physics, 1/e M. Ali Omar, Pearson India Solid State. Physics, M.A. Wahab, Narosa Publications.

*** Latest editions of all the suggested books are recommended**

Semester-V

Introduction to MATLAB

[BAS565 amended vide approval dt. November 29, 2019 of V.C]

Course Code: BAS565 **L T P C**

0 2 2 2

Objective: How to use MATLAB as a programming tool and how to write a program that is well documented and easy to read.

Course Contents:

Unit-I **(Lectures 08)**

MATLAB Software Working Environment: MATLAB Initializing & Ending, Quick Access Tool Bar, Command Window, Command History, Workspace Browser, Current folder window, Editor Window, Help Browser, Figure Window, Simulink Window, Creating Command Shortcuts, MATLAB Path Options MATLAB Programming, Debugging MATLAB codes**.**

Unit-II **(Lectures 08)**

MATLAB Input Entry & Executing Commands & Methods: Input and Output, Symbolic Mathematics, Arithmetic, Algebra, Symbolic Expressions, Variable Precision and Exact Arithmetic, Errors in Input, Variables and Assignments, Predefined Variables, Operators & Special Characters, Control Structures, Input & Output Commands.

Matrices: Arrays, Matrix representation, Matrix & Inverse of Matrix, Entry Retrieving, Matrix Division, Eigen values and vectors, Special matrices.

Unit-III **(Lectures 08)**

Polynomials: Polynomial Overview, Representing Polynomials, Arithmetic operations on polynomials, Polynomial Roots, Polynomial coefficients, Polynomial Evaluation, Convolution and De-convolution.

Solving Equations: Solution to first order differential Equations, Solving Second Order Differential Equations, Partial Fraction Expansion

Unit-IV **(Lectures 08)**

MATLAB Graphics: 2-D Plot, Plotting Process, Creating a Graph, Exploring Data, Editing the Graph Components, Annotating Graphs, Printing and Exporting Graphs, Accessing Properties with the Property Inspector, Plotting Two Variables with Plotting Tools, Changing the Appearance of Lines and Markers, Placing Markers at Every Tenth Data Point, Adding More Data to the Graph, To add data using the Plot Browser, Changing the Type of Graph, Modifying the Graph Data Source, Providing New Values for the Data Source, Figure Windows, Clearing the Figure for a New Plot, Controlling the Axes, Setting Axis Limits, Setting the Axis Aspect Ratio - Setting Axis Visibility, Setting Grid Lines**.**

Unit-V **(Lectures 08)**

Application Tools: Partial Differential Equation (PDE), Curve fitting

List of Experiments:

Note: Minimum 15 experiments should be performed:

1. To find the Local Environment for MATLAB programming.
2. Enter the m*n order matrix
3. Find the matrix transpose
4. Find the inverse of matrix
5. Find the addition, subtraction & multiplication of matrix

6. If $V_1 = 5v$, $V_2 = 6v$, $Z_{11}=2$, $Z_{12}=1$, $Z_{21}=3$ $Z_{22}=4$, get the value of I_1 and I_2? **7.** If A1 = [2 7 6 8 9 10] and B1 = [6 4 3 2 3 4], Find

a.C1 = A1.*B1

b. D1 = A1./B1

8. If r1 = [7 3 5] and s1 = [2 4 3], get

i. q1 = r1.^s1

ii. q2 = r1.^2

9. State if the following statements are true or false,

i. If a MATLAB statement ends with a semicolon (;) MATLAB evaluates the statement but suppresses the display of the results.

ii. The end of each row in entering a matrix, is indicated by a semicolon (;)

iii. MATLAB is case sensitive in naming variables only.

10. Enter the following matrix,

A =

1	**3**	**4**	**2**
2	**0**	**1**	**6**
4	**1**	**2**	**7**
0	**3**	**6**	**4**

a. Get the diagonal of the matrix A

b. Get the sum of each column in the matrix A

c.Get the sum of each row in the matrix A

d. Get the sum of all elements in the matrix A

e.Add 2 to the element in the 2nd row and 3rd column

11. Enter the following complex number, z = 2-j3 then

a.Get the real and the imaginary parts of z

b. Get the magnitude and the phase angle of z

c.If y = 3+j5, calculate the following: y+z, y-z, y×z

12. If w = [1+j 5-2*j; 3+2*j 4+3*j]

a.Get the conjugate transpose

b. Get the point transpose

c.Type the elements of 2nd row only

13. Reshape matrix.
14. Eliminate Rows of matrix.
15. Sorting a matrix
16. Plot, xlabel, ylabel, title, and axis commands;
17. Find difference between plot, semilogy, semilogx, logog commands
18. Bar plot, Pie chart, 3D plots command
19. Creating and performing symbolic computations.

Text Books-

1. Amos Gilat, "MATLAB: An Introduction with Applications", Wilay Publication
2. J. Chakrabarty "Introduction to Matlab" Universities Press.
3. R. Pratap, "Getting Started with MATLAB A Quick Introduction for Scientists and Engineers"

Oxford University Press

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-V
Laser Physics (Lab)

Course Code: BAS566 **L T P C**
0 0 3 2

Objective: To study various laws and physical constant practically like, Malus law for plane polarized light, Stefan`s law of radiation, Boltzmann constant using V-I characteristics of PN junction diode, Cauchy's constant, etc.

List of Experiments:

Note: Select any ten experiments from the following list.

1. To verify the law of Malus for plane polarized light.
2. To determine the specific rotation of sugar solution using Polarimeter.
3. To determine the wavelength and velocity of ultrasonic waves in a liquid (Kerosene Oil or Xylene) by studying the diffraction through ultrasonic grating.
4. To verify the Stefan`s law of radiation and to determine Stefan's constant.
5. To determine the Boltzmann constant using V-I characteristics of PN junction diode.
6. To study Faraday's effect.
7. To study Optical absorption – spectrophotometer.
8. Laser coherence and divergence measurement.
9. Determine of Cauchy's constant by using spectrometer.
10. Determine of the grating radial spacing of the Compact Disc (CD) by reflection using He-Ne or solid state laser.
11. V-I Characteristics of IR sensor.
12. To find the polarization angle of laser light using polarizer and analyzer.
13. Study the Characteristics of LDR.
14. V-I Characteristics of LED.

Text and References Books:

1. Lasers and Non-linear optics. By- B. B. Laud.
2. LASERS- Theory and Applications, by- Thyagarajan and A. K. Ghatak.
3. Optics and LASER, by- V. K. Sewane
4. Introduction to Lasers, by- Dr. Avadhanulu, Dr. P. S. Hemne, Publisher: S. Chand & Company Ltd. New Delhi.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-V
Solid State Physics (Lab)

Course Code: BAS567 **L T P C**

0 0 3 2

Objective: To study physical properties of materials, Hall effect, dielectric constant, Characteristics of Transistor, Zener diode or Tunnel diode & magnetic susceptibility etc.

List of Experiments:

Note: Select any ten experiments from the following list.

1. Measurement of resistivity by using 4-probe technique.
2. Study of Hall effect.
3. Measurement of magnetoresistance.
4. Measurement of magnetic susceptibility using Quinck's method.
5. Study of thermoluminescence of color center
6. Study of magnetic hysteresis.
7. Measurement of dielectric constant.
8. Study of Raman effect.
9. Characteristics of Transistor.
10. Characteristics of Zener or Tunnel diode.
11. Measurement of magnetic susceptibility using Guoy's method.

Text and References Books:

1. Introduction to Solid State Physics, Charles Kittel, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, Prentice-Hall of India.
3. Introduction to Solids, Leonid V. Azaroff, Tata Mc-Graw Hill.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester V
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP511 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester-VI
Statistical Mechanics

Course Code: BAS620 **L T P C**
4 0 0 4

Objective: To learn laws of Statistical Mechanics; Classical theory of radiation, Quantum theory of radiation, M-B, B-E & F-D distribution laws.

Course Contents:

Unit I **(Lectures 08)**

Classical Statistics: Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Ensemble Concept, Partition Function, Thermodynamic Functions of Finite Number of Energy Levels, Negative Temperature, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Law of Equipartition of Energy – Applications to Specific Heat and its Limitations

Unit II **(Lectures 08)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation, Pure Temperature Dependence, Kirchhoff's Law, Stefan-Boltzmann Law and Wien's Displacement law, Saha's Ionization Formula.

Unit III **(Lectures 08)**

Quantum Theory of Radiation: Radiation: Stefan-Boltzmann Law: Thermodynamic Proof, Radiation Pressure, Spectral Distribution of Black Body Radiation, Wien's Distribution Law and Displacement Law Planck's Quantum Postulates. Planck's Law of Blackbody Radiation

Unit IV **(Lectures 08)**

Bose-Einstein Statistics: B-E distribution law. Thermodynamic functions of a Completely Degenerate Bose Gas, Bose-Einstein condensation, properties of liquid He (qualitative description).
Radiation as photon gas, Bose's derivation of Planck's law.

Unit V **(Lectures 08)**

Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of an ideal Completely Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals. White Dwarf Stars, Chandrasekhar Mass Limit.

Text Books:

1. Statistical Physics: Berkeley Physics Course by F Reif (Tata McGraw-Hill Company Ltd.
2. Statistical and Thermal Physics: an introduction by S. Lokanathan and R. S. Gambhir, P.H.I.

Reference Books:

1. Statistical Mechanics by R. K. Patharia, Oxford: Butterworth.
2. Statistical Mechanics by K. Huang, Wiley.
3. Statistical Mechanics by eyring.

*** Latest editions of all the suggested books are recommended**

Semester-VI
Nuclear & Particle Physics

Course Code: BAS621 **L T P C**
4 0 0 4

Objective: To study physical properties of Nuclei and Models, Two-nucleon System, Nuclear Stability, Accelerators and Detectors and Elementary Particles etc.

Course Contents:

Unit-I **(08 Lectures)**

Properties of Nuclei and Models: Introduction to the nucleus, Fermi gas model, Binding energy, Bethe-Weizsaecker mass formula and its application to explain most stable isobars and nuclear fission, Inferences of nuclear size from elastic electron-nucleus experiments (no derivation).

Unit-II **(08 Lectures)**

Nuclear Force and Two-nucleon System: Properties of nucleon-nucleon interaction, General forms of N-N potential, Description of low energy neutron-proton scattering to show the spin dependence of nuclear force, Ground state properties of deuteron, Simple consideration of deuteron using central potential (square well).

Unit-III **(08 Lectures)**

Nuclear Stability: Nucleon emission, separation energy, Alpha decay and its energy spectrum, Q-value, Gamow's theory of alpha decay (no derivation), Beta decay and its energy spectrum (for example, 137Cs), Need for neutrinos, Q-value for beta decay, Gamma decay, Selection rules for gamma transitions (no derivation).

Unit-IV **(08 Lectures)**

Accelerators and Detectors: Van de Graaff and Linear accelerators, Synchrotrons, Geiger Muller detector, Scintillation detector.

Unit-V **(08 Lectures)**

Elementary Particles: Classification of particles and their interactions, Quantum numbers, Quarks as the building blocks of hadrons colour degree of freedom.

Text and References Books:

1. Introductory Nuclear Physics: S. S. M. Wong.
2. Concepts of Nuclear Physics: B. L. Cohen.
3. Fundamentals of Nuclear Physics: B. B. Srivastava.
4. Introduction to Nuclear Physics: H. A. Enge.

*** Latest editions of all the suggested books are recommended**

Semester-VI
Medical Physics

Course Code: BAS622 **L T P C**
4 0 0 4

Objective: To study physical properties of X-rays, radiation units, exposure, absorbed dose, etc. imaging techniques and radiation therapy & protection physics etc.

Course Contents:

Unit I **(08 Lectures)**

X- Rays: Electromagnetic spectrum - production of x-rays - x-ray spectra - Brehmsstrahlung - Characteristic x-ray - X-ray tubes - Coolidge tube - x-ray tube design - tube cooling - stationary mode - Rotating anode x-ray tubes - Tube rating - quality and intensity of x-ray. X-ray generator circuits - half wave and full wave rectification - filament circuit - kilo voltage circuit - high frequency generator - exposure timers - HT cables.

Unit II **(08 Lectures)**

Radiation Physics: Radiation units - exposure - absorbed dose - rad gray - kera relative biological effectiveness - effective dose - sievert - inverse square law - interaction of radiation with matter - linear attenuation coefficient. Radiation Detectors - Thisble chamber - condenser chambers - Geiger counter - Scintillation counter - ionization chamber - Dosimeters - survey methods - area monitors - TLD and semiconductor detectors.

Unit III **(08 Lectures)**

Medical Imaging Physics: Radiological imaging - Radiography - Filters - grids - cassette - X-ray film - film processing - fluoroscopy - computed tomography scanner - principle function - display - generations - mammography. Ultrasound imaging - magnetic resonance imaging (MRI) - thyroid uptake system - Gamma camera (Only Principle, function and display).

Unit IV **(08 Lectures)**

Radiation Therapy Physics: Radiotherapy - kilo voltage machines - deep therapy machines - tele-cobalt machines - Medical linear accelerator. Basics of Teletherapy units - deep x-ray, telecobalt units, medical linear accelerator - Radiation protection - external beam characteristics - phantom - dose maximum and build up - bolus - percentage depth dose - tissue - air ratio - back scatter factor.

Unit V **(08 Lectures)**

Radiation Protection: Principles of radiation protection - protective materials - radiation effects - somatic, genetic stochastic and deterministic effect, Personal monitoring devices - TLD film badge - pocket dosimeter.

Text and References Books:

1. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi.
2. Christensen's Physics of Diagnostic Radiology: Curry, Dowdey and Murry - Lippincot Williams and Wilkins.
3. Physics of Radiation Therapy: FM Khan - Williamd and Wilkins.
4. The essential physics of Medical Imaging: Bushberg, Seibert, Leidholdt and Boone Lippincot Williams and Wilkins.
5. HE Johns and Cunningham - The Physics of Radiology.
6. Nuclear medicine physics: Chandra - Lippincot Williams and Wilkins.

*** Latest editions of all the suggested books are recommended**

Semester-VI
Atmospheric Physics

Course Code: BAS623 **L T P C**
4 0 0 4

Objective: The objective of this course is to provide the basic structure of earth atmosphere, their observation. Student will also learn remote sensing as well as atmospheric dynamics.

Course Contents:

Unit I: **(Lectures 08)**

Elements of earth's atmosphere -Vertical variations in compositions of the atmosphere – homosphere, heteorosphere, ionosphere; auroras; thermal structure of the atmosphere – troposphere, stratosphere, mesosphere, thermosphere; horizontal distribution of temperature, pressure and density, distribution of winds, horizontal and vertical winds, land breeze and sea breeze.

Unit II **(Lectures 08)**

Atmospheric observations: Importance of meteorological observations, measurement of temperature and humidity, measurement of wind and pressure, measurement of precipitation, upper air observations - radiosonde, rawinsonde, rocketsonde, pyrgeometer, pyrheliometer, Radar, Doppler weather radar & applications.

Unit III **(Lectures 08)**

Space physics: Basics of ionosphere formation, D-, E- and F-layers, composition of the ionosphere, effect of terrestrial and solar radiation on earth's atmosphere, photochemical processes, currents in ionosphere, electrical conductivity, techniques of ionosphere measurements

Unit IV **(Lectures 08)**

Remote sensing: Concepts of remote sensing, Energy interaction with earth's surface features, Signatures of vegetation, soil and water bodies of the earth's surface, Classification of remote sensors, Spectral, spatial and temporal resolution, IR and microwave sensors, Data reception and products, Application of Remote sensing for earth's resource management.

Unit V **(Lectures 08)**

Atmospheric dynamics: Large scale motions, vorticity and divergence, streamline and trajectories, dynamics of horizontal flow – apparent and real forces, equation of motion, geostrophic wind, effect of friction, gradient wind, thermal wind, suppression of vertical

motions, conservation law for Vorticity, potential vorticity; primitive equations – pressure as a vertical coordinate, hydrostatic balance, thermodynamic energy equation.

Reference & Text Books:

1. Basics of Atmospheric Science, A Chandrasekar, PHI Publications.
2. Atmospheric Science-An Introductory Survey, John M Wallace and Peter V Hobbs, Academic Press, Elsevier.
3. A course in Dynamic meteorology, Naval Pandarinath, BS Publications.
4. The Physics of Monsoons, RN Keshvamurthy and M Shankar Rao, Allied Publishers.
5. Basic Space Plasma Physics: W Baumjohann and RA Treumann, Imperial College Press.
6. Fundamentals of Remote Sensing, George Joseph, University Press Pvt. Ltd. Hyderabad.

*** Latest editions of all the suggested books are recommended**

Semester-VI

Open Elective

Introduction to Statistical Package for Social Sciences

Subject Code: BAS011

L	T	P	C
3	0	0	3

Objectives: This course is intended for students with limited or no experience with the statistical package SPSS. This course is designed to give students the necessary skills to analyze research projects.

Course Contents-

Unit-I **(Lectures 08)**

Introduction to SPSS: Overview of statistical packages; Data analysis with SPSS: General aspects, workflow, and critical issues; SPSS interface: data, variable, output, and syntax view; General description, functions, menus, and commands.

Unit-II **(Lectures 08) Input and data management:** Defining variables; Entering and modifying data: manual and automated input of data, and file import; Data Management: Listing cases, replacing missing values, computing new variables, exploring data, selecting cases, sorting cases, merging files etc.; Data Transformation; Output management.

Unit-III **(Lectures 08)**

Descriptive analysis of data: Frequencies; Descriptive Statistics: measures of central tendency, variability, deviation from normality; Crosstabs and chi-square analyses; Charts: creating &editing graphs (Bar; histograms; scatter diagram; percentiles etc.).

Unit-IV **(Lectures 08)**

Statistical tests: Parametric Tests: Means; t-test (Independent samples, paired samples, and one sample tests);One-way ANOVA; Non parametric tests: Mann-Whitney U, Wilcoxon signed-rank, Kruskal-Wallis.

Unit-V **(Lectures 08)**

Correlation and regression: Correlation: Bivariate and Partial correlation; correlation matrix; Regression: Simple linear regression; Multiple regression analysis; Factor analysis, Cluster analysis.

Text and References Books:

1. Field, Andy. "Discovering Statistics Using SPSS." 3rd Ed., Sage Publishers.
2. Pallant, Julie. "SPSS Survival Manual." 4th Ed., McGraw-Hill.
3. Cronk, Brian. "How to Use SPSS: A Step-By-Step Guide to Analysis and Interpretation." 5thEd.
4. Kiran Pandya, Smruti Bulsari, Sanjay Sinha, "SPSS in simple steps" Wiley/Dreamtech Press.

***Latest editions of all the suggested books are recommended.**

Industrial Chemistry

Course Code: BAS012 **L T P C**

3 0 0 3

Objective: Industrial chemistry course content include silicate technology, glass manufacturing, nitogenous & phosphate fertilizers and application of lubricants. The other industrial preparations are soap, detergents, paints, insecticides & drug.

Course Contents:

Unit I **(08 Lectures)**

Silicate Industries:

Glass: Glassy state and its properties, classification (silicate and non-silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Ceramics: Important clays and feldspar, ceramic, their types and manufacture. Hightechnology ceramics and their applications.

Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit II **(08 Lectures)**

Fertilizers:

Different types of fertilizers. Need for fertilizers, Straight and mixed fertilizers, Sources offertilizers, Artificial fertilizers, Manufacture of the following fertilizers: Urea, ammonium nitrate, calcium ammonium nitrate, Ammonium sulphate, ammonium phosphates; polyphosphate, superphosphate, compound and mixed fertilizers, potassium chloride, potassium sulphate. NPK fertilizers**.**

Unit III **(08 Lectures)**

Alloys:

Classification of alloys, ferrous and non-ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, demagnetization, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

Unit IV **(08 Lectures)**

Paints and Pigments: Introduction, : Characteristic of the pigments Classification of paints, Manufacture of paints, for example white lead, Sublimed white lead (Basic sulphate), Zinc oxide, Lithophone, Titanium dioxide, manufacture, Ultramarine blue , Read lead, Chrome green, Guignet's green , Reinmann's green , Setting of the paints Requirements of a good paint Emulsion paints, Constituents of emulsion paints. Advantages, Luminescent paints. Heat resistant paints, Varnishes, Manufacturing of varnishes, Lacquers, Solvents and thinners.

Unit V **(08 Lectures)**

Soaps & Detergents:

Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

Soap: Soap and its manufacture, Toilet and transparent soap, Other soaps, Oil to be used for soap, Cleansing action of soap.

Detergents: Principal groups of synthetic detergents, Classification of surface active agents, Anionic detergents, Cationic detergents. Non-ionic detergents. Amphoteric detergents.

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Text & Reference Books:

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut.

*** Latest editions of all the suggested books are recommended**

Introduction to Nanoscience & Technology

Course Code: BAS013 **L T P C**

3 0 0 3

Objective: To study physical properties of nanoscale systems, QDs, Synthesis of various nanomaterials, characterization & applications of nanomaterials etc.

Course Contents:

Unit I **(08 Lectures)**

Nanoscale Systems: Length, energy, and time scales - Quantum confinement of electrons in semiconductor nanostructures: Quantum confinement in 3D, 2D, 1D and zero dimensional structures-Size effect and properties of nanostructures- Landauer-Buttiker formalism for conduction in confined geometries - Top down and Bottom up approach.

Unit II **(08 Lectures)**

Quantum Dots: Excitons and excitonic Bohr radius – difference between nanoparticles and quantum dots - Preparation through colloidal methods - Epitaxial methods- MOCVD and MBE growth of quantum dots - current-voltage characteristics - magneto tunneling measurements - spectroscopy of Quantum Dots: Absorption and emission spectra - photo luminescence spectrum -optical spectroscopy - linear and nonlinear optical spectroscopy.

Unit III **(08 Lectures)**

Synthesis of Nanostructure Materials: Gas phase condensation – Vacuum deposition -Physical vapor deposition (PVD) - chemical vapor deposition (CVD) – laser ablation- Sol-Gel- Ball milling –Electro deposition- electroless deposition – spray pyrolysis – plasma based synthesis process (PSP) - hydrothermal synthesis.

Unit IV **(08 Lectures)**

Characterization: Principle and working of Atomic Force Microscopy (AFM) and Scanning tunneling microscopy (STM) - near-field Scanning Optical Microscopy – Principle of Transmission Electron Microscopy (TEM) – applications to nanostructures – nanomechanical characterization – nanoindentation.

Unit V **(08 Lectures)**

Nanotechnology Applications: Applications of nanoparticles, quantum dots,
nanotubes and nanowires for nanodevice fabrication – Single electron transistors, coulomb blockade effects in ultra-small metallic tunnel junctions - nanoparticles based solar cells and quantum dots based white LEDs – CNT based transistors – principle of dip pen lithography.

Text & References Books:

1. Hand book of Nanoscience, Engineering and Technology (The Electrical Engineering handbook series), Kluwer Publishers.
2. "Sol-Gel Science", C.J. Brinker and G.W. Scherrer, Academic Press, Boston.
3. Nanoscale characterization of surfaces & interfaces, N John Dinardo, Weinheim Cambridge: Wiley-VCH.
4. "Nanotechnology" G. Timp. Editor, AIP press, Springer-Verlag, New York.
5. "Nanostructured materials and nanotechnology'', Concise Edition, Editor:-Hari Singh Nalwa; Academic Press, USA.

*** Latest editions of all the suggested books are recommended**

Semester-VI
Seminar, Viva & Presentation

Course Code: BAS698 **L T P C**

0 0 4 2

For students to enter into preliminary research field both in theory and experiment the concept of Seminar, Presentation & Viva has been introduced in the final Semester. In this report, student will explore new developments from the books and journals, collecting literature / data and prepare the report in form of power point presentation based on his / her work and studies, and submit in concern department.

General guidelines are as follows-

1. Students will make seminar report which should be preferably a working of third thoughts based on their subject.
2. The student will be assigned a faculty guide who will be the supervisor of the students. The faculty would be identified at the end of the V^{th} semester.
3. Internal assessment of the students should be done at least twice in the semester.
4. The students shall present the final presentation live using overhead projector PowerPoint presentation on LCD to the internal committee and the external examiner.
5. The internal evaluation committee shall consist of faculty members constituted by the college which would be comprised of at least three members comprising of the department Coordinator's, Class Coordinator and a nominee of the Director/Principal. The students guide would be special in invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each members of the committee.

The Marking shall be as follows.

Internal: 50 marks

By the Faculty Guide – 25 marks

By Committee appointed by the Director/Principal – 25 marks

External: 50 marks

By External examiner appointed by the University – 50

Top Cover- The sample top cover shall be as under:

TITLE (18 pt Times New Roman CAPS)

SEMINAR REPORT (14)

Submitted in Partial Fulfillment of the Requirements for the Degree of (14)

BACHELOR OF SCIENCE (16)

In (16)

Physics (16)

Submitted by (12)

Name

Enrollment No

Under the guidance of (12)

Name of Guide & Designation (14)

Department of Physics (14)
Faculty of Engineering
Teerthanker Mahaveer University (14)
Moradabad-244001(14)

(December, 2017) (14)

EVALUATION SHEET

(To be filled by the GUIDE & Internal Examiners only)

Name of Candidate:
Roll No:

Class and Section:

Please evaluate out of Five marks each.

S. No.	Details	Marks (5) Guide	Marks (5) Int. Exam. 1	Marks (5) Int. Exam. 2
1.	Objective Identified &Understood			
2.	Literature Review / Background Work (Coverage, Organization, Critical Review)			
3.	Discussion/Conclusions (Clarity, Exhaustive)			
4.	Slides/Presentation Submitted (Readable, Adequate)			
5.	Frequency Of Interaction (Timely Submission, Interest Shown, Depth, Attitude)			
	Total (Out of 25)			
	Average out of 50			

Signature: Signature: Signature:
Date: Date: Date:

EVALUATION SHEET FOR EXTERNAL EXAMINER

(To be filled by the External Examiner only)

Name of Candidate:

Roll No:

I. For use by **External Examiner ONLY**

S. No.	Details	Marks (10) each
1.	Objective Identified & Understood	
2.	Literature Review / Back ground Work (Coverage, Organization, Critical Review)	
3.	Discussion/Conclusions (Clarity, Exhaustive)	
4.	Power Point Presentation (Clear, Structured)	
5.	Slides (Readable, Adequate)	
	Total (Out of 50)	

Signature:

Date:

EVALUATION SUMMARY SHEET

(To be filled by External Examiner)

Name and Roll No.	Internal Examiners (50)	External Examiner (50)	Total (100)	Result (Pass/Fail)

Note: The summary sheet is to be completed for all students and the same shall also be Compiled for all students examined by External Examiner. The Format shall be provided by the course coordinator.

Semester VI
DISCIPLINE & GENERAL PROFICIENCY

Course Code: BGP611 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal