Pre-Revision

Study & Evaluation Scheme

of

Bachelor of Science (Hons.) (Physics)

[Applicable for Academic Session 2018-19]
[Approved by Hon'ble VC dated August 08, 2017]
[With revision approved by VC date July 23, 2018, August 14, 2018, January 23, 2019 & November 29, 2019]

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

Study & Evaluation Scheme
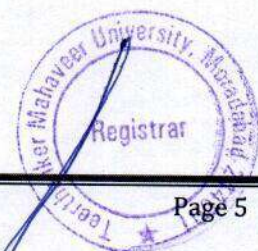
Semester I

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

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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	TMU201	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 Skills-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

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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 Skills-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

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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
	Open Elective								
5	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

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Post Revision

Study & Evaluation Scheme

of

Bachelor of Science (Hons.) (Physics)

[Applicable for Academic Session 2019-20]

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

The aim of bachelor's degree programme in physics is intended to provide:

1. Read, understand and interpret physical information – verbal, mathematical and graphical.
2. Impart skills required to gather information from resources and use them.
3. To give need based education in physics of the highest quality at the undergraduate level thus enabling them to undertake further studies in Physics in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship
4. Offer courses to the choice of the students.
5. Perform experiments and interpret the results of observation, including making an assessment of experimental errors. Activities outside the classroom, such as independent research or study, allow students to further develop their knowledge and understanding.
6. Provide an intellectually stimulating environment to develop skills and enthusiasms of students to the best of their potential.
7. Attract outstanding students from all backgrounds.
8. To enable the graduate prepare for national as well as international competitive examinations, especially IIT-JAM and UPSC Civil Services Examination.

Course handouts for students will be provided in every course. A course handout is a thorough teaching plan of a faculty taking up a course. It is a blueprint which will guide the students about the pedagogical tools being used at different stages of the syllabus coverage and more specifically the topic-wise complete plan of discourse, that is, how the faculty members treat each and every topic from the syllabus and what they want the student to do, as an extra effort, for creating an effective learning. It may be a case study, a role-play, a classroom exercise, an assignment- home or field, or anything else which is relevant and which can enhance their learning about that particular concept or topic. Due to limited availability of time, most relevant topics will have this kind of method in course handout.

## B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the B.Sc. (H) program:

- *Core competency:* Core courses of B.Sc. (Hons.) Physics are intended to provide deep understanding and interpreting skill of physical information – verbally, mathematically and graphically. The theoretical study along with laboratory courses also provides the connection between theoretical knowledge taught in textbooks/ homework problems and the experimental foundations of this knowledge. A wide range of core courses provides a deep understanding of classical as well as Modern Physics and train the students to analyses, interpret not only the physical phenomena but also develop their decision-making ability and contribute to the other area of life.

  The core courses include 15 theory Papers and 8 laboratory courses which covers both Classical and Modern Physics, Electricity and Magnetism, Mechanics, Optics, Statistical Physics, Thermodynamics, Electromagnetic Theory, Quantum Physics, Atomic and Molecular Physics and Solid-State Physics etc.

- *Generic Elective Course (GEC):* Generic Elective is an interdisciplinary additional subject that is compulsory in the first, second, third and fourth semester of a program. The score of Generic Elective is counted in your overall aggregate marks under Choice Based Credit System (CBCS). Each Generic Elective paper will be of 4 Credits and students will have the choice of taking 4 GE's: One paper in Semester I, II, III& IV. Each student has to take Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Generic Electives.
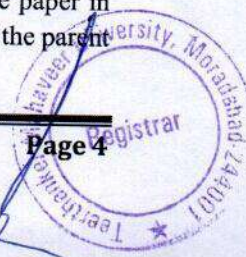
Study & Evaluation Scheme

Semester I

S. No.		Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	BAS119	Mathematical Physics-I	4	-	-	4	40	60	100
2	CC	BAS114/ BAS213	Mechanics	4	-	-	4	40	60	100
3	GE	BAS120	Fundamentals of Inorganic Chemistry	4	-	-	4	40	60	100
4	SEC	BCS111	Computer System & Programming in C++	3	-	-	3	40	60	100
5	AEC	TMUGE101	English Communication–I	2	-	2	3	40	60	100
6	CC	BAS166/ BAS267	Mechanics (Lab)	-	-	4	2	50	50	100
7	GE	BAS168	Fundamentals of Inorganic Chemistry (Lab)	-	-	4	2	50	50	100
8	SEC	BCS161	Computer System & Programming in C++ (Lab)	-	-	2	1	50	50	100
			Total	17	0	12	23	350	450	800

Value Added Course:

It is an audit course. The performance of the student in this course will not be counted in the overall result however the student has to pass it compulsorily with 45% marks.

1	VAC-1	TMUGA-101	Foundation in Quantitative Aptitude	2	1	-	-	40	60	100

Semester II

S. No.		Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	BAS218	Electricity and Magnetism	4	-	-	4	40	60	100
2	CC	BAS220	Waves & optics	4	-	-	4	40	60	100
3	GE	BAS219	Fundamentals of Physical Chemistry	4	-	-	4	40	60	100
4	AEC	TMU201	Environmental Studies	2	1	-	3	40	60	100
5	AEC	TMUGE201	English Communication -II	2	-	2	3	40	60	100
6	CC	BAS268	Electricity and Magnetism (Lab)	-	-	4	2	50	50	100
7	CC	BAS266	Waves & Optics (Lab)	-	-	4	2	50	50	100
8	GE	BAS269	Fundamentals of Physical Chemistry (Lab)	-	-	4	2	50	50	100
			Total	16	1	14	24	350	450	800

*Value Added Course:

1	VAC-2	TMUGA-201	Analytical Reasoning	2	1	-	-	40	60	100

B.Sc. (H) (Physics)-Semester III

S. No	Category	Course Code	Course	Periods L	Periods T	Periods P	Credit	Internal	External	Total
1	CC	BAS314	Elements of Modern Physics	3	1	-	4	40	60	100
2	CC	BAS320	Thermal Physics	4	-	-	4	40	60	100
3	AECC	TMUGE301	English Communication-III	2	-	2	3	40	60	100
4	GEC		Generic Elective Course — Generic Elective-III	4	-	-	4	40	60	100
5			Generic Elective Course (Lab) — Generic Elective-III (Lab)	-	-	4	2	50	50	100
6	LC	BAS364	Elements of Modern Physics (Lab)	-	-	4	2	50	50	100
7	LC	BAS365	Thermal Physics (Lab)	-	-	4	2	50	50	100
8	DGP	BGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	13	1	14	21	310	390	700

*Value Added Course:

				L	T	P		Internal	External	Total
1	VAC-3	TMUGA-302	Modern Algebra and Data Management	2	1	-	-	40	60	100
2	VAC-4	TMUGS-301	Managing Self	2	1	-	-	50	50	100

B.Sc. (H) (Physics)-Semester IV

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	BAS433	Mathematical Physics-II	5	1	-	6	40	60	100
2	CC	BAS421	Semiconductor Physics	4	-	-	4	40	60	100
3	CC	BAS434	Atomic & Laser Physics	4	-	-	4	40	60	100
4	AECC	TMUGE401	English Communication-IV	2	-	2	3	40	60	100
5	GEC		Generic Elective Course — Generic Elective-IV	4	-	-	4	40	60	100
6			Generic Elective Course (Lab) — Generic Elective-IV (Lab)	-	-	4	2	50	50	100
7	LC	BAS473	Atomic &Laser Physics (Lab)	-	-	4	2	50	50	100
8	DGP	BGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	19	1	10	25	300	400	700

*Value Added Course:

1	VAC-5	TMUGA-402	Advance Algebra and Geometry	2	1	-	-	40	60	100
2	VAC-6	TMUGS-401	Managing Work and Others	2	1	-	-	50	50	100

MOOC Course:

1	MOOC-1	MOOC12	MOOC Program –I (Optional)	-	-	-	2	-	100	100

B.Sc. (H) (Physics)-Semester V

S. No	Category	Course Code	Course		Periods			Credit	Evaluation Scheme		
					L	T	P		Internal	External	Total
1	CC	BAS520	Electromagnetic Theory		4	-	-	4	40	60	100
2	CC	BAS523	Quantum Mechanics		4	-	-	4	40	60	100
3	CC	BAS537	Mathematical Physics-III		5	1	-	6	40	60	100
4	CC	BAS524	Solid State Physics		4	-	-	4	40	60	100
5	AECC	BHM515	Human values & Professional Ethics		3	-	-	3	40	60	100
6	DSE		Discipline Specific Elective Courses	Discipline Specific Elective Course-I	4	-	-	4	40	60	100
7	OEC		Open Elective Course	Open Elective-I	3	-	-	3	40/50	60/50	100
8	LC	BAS567	Solid State Physics (Lab)		-	-	4	2	50	50	100
9	PROJ	BAS 598	Industrial Training & Presentation		-	-	6	3	50	50	100
10	DGP	BGP511	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		27	1	4	33	380/390	520/510	900
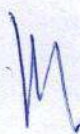
MOOC Course:

1	MOOC-2	MOOC13	MOOC Program –II (Optional)	-	-	-	2	-	100	100

B.Sc. (H) (Physics)-Semester VI

S. No	Category	Course Code	Course		Periods			Credit	Evaluation Scheme		
					L	T	P		Internal	External	Total
1	CC	BAS635	Statistical& Classical Mechanics		4	-	-	4	40	60	100
2	CC	BAS621	Nuclear & Particle Physics		4	-	-	4	40	60	100
3	DSE		Discipline Specific Elective Courses	Discipline Specific Elective Course-II	4	-	-	4	40	60	100
4	OEC		Open Elective Course	Open Elective-II	3	-	-	3	40/50	60/50	100
5	AECC	BHM615	Entrepreneurship		3	-	-	3	40	60	100
6	SEC	BAS636	Design and Installation of Solar Photovoltaic System (Lab)		-	2	2	3	50	50	100
7	PROJ	BAS698	Project		-	-	10	5	50	50	100
8	DGP	BGP611	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		18	2	12	26	300/310	400/390	700

ELECTIVE COURSES OFFERED

S. No	Code	Course	L	T	P	Credi
Semester III- Generic Elective III-(Any one)
1	BAS321	Fundamentals of Organic Chemistry	4	-	-	4
2	BAS331	Numerical Analysis	4	-	-	4
Semester III- Generic Elective III (Lab) -(Select one Corresponding Lab)
3	BAS366	Fundamentals of Organic Chemistry (Lab)	-	-	4	2
4	BAS371	Numerical Analysis (Lab)	-	-	4	2
Semester IV- Generic Elective IV- (Any one)
5	BAS434	Polymer Chemistry	4	-	-	4
6	BAS435	Introduction to Probability	4	-	-	4
Semester IV- Generic Elective IV (Lab) -(Select one Corresponding Lab)
7	BAS471	Polymer Chemistry (Lab)	-	-	4	2
8	BAS472	Statistical Package for Social Sciences (Lab)	-	-	4	2
Semester V-Discipline Specific Elective Course-I -(Any one)
9	BAS538	Material Science	4	-	-	4
10	BAS013	Introduction to Nano Science and Technology	4	-	-	4
Semester VI-Discipline Specific Elective Course-II -(Any one)
11	BAS622	Medical Physics	4	-	-	4
12	BAS623	Atmospheric Physics	4	-	-	4

Course Code: TMUGA-101	**Value Added Course** B.Sc (H) Physics- Semester-I **Foundation in Quantitative Aptitude**	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Solving complex problems using Criss cross method, base method and square techniques.	
CO2.	Applying the arithmetical concepts of Average, Mixture and Allegation.	
CO3.	Evaluating the different possibilities of various reasoning based problems in series, Blood relation and Direction.	
CO4.	Operationalizing the inter-related concept of Percentage in Profit Loss and Discount, Si/CI and Mixture/Allegation.	
Course Content:		
Unit-1:	**Speed calculations** Squares till 1000,square root, multiplications: base 100, 200 300 etc., 11-19, crisscross method for 2X2, 3X3, 4X4, 2X3, 2X4 etc., cubes, cube root	3 Hours
Unit-2:	**Percentages** Basic calculation, ratio equivalent, base, change of base, multiplying factor, percentage change, increment, decrement, successive percentages, word problems	5 Hours
Unit-3:	**Profit Loss Discount** Basic definition, formula, concept of mark up, discount, relation with successive change, faulty weights	5 Hours
Unit-4:	**SI and CI** Simple Interest, finding time and rate, Compound Interest, difference between SI and CI, Installments	4 Hours
Unit-5:	**Averages** Basic Averages, Concept of Distribution, Weighted Average, equations	3 Hours
Unit-6:	**Mixtures and allegations** Mixtures of 2 components, mixtures of 3 components, Replacements	5 Hours
Unit-7:	**Blood relations** Indicating type, operator type, family tree type	3 Hours
Unit-8:	**Direction sense** Simple statements, shadow type	2 Hours
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * **Latest editions of all the suggested books are recommended.**	

Course Code: TMUGA-201	Value Added Course B.Sc. (H) Physics- Semester-II **Analytical Reasoning**	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the arithmetical concepts in Ratio Proportion Variation.	
CO2.	Employing the techniques of Percentage; Ratios and Average in inter related concepts of Time and Work, Time Speed and Distance.	
CO3.	Identifying different possibilities of reasoning based problems of Syllogisms and Venn diagram.	
CO4.	Examining the optimized approach to solve logs and Surds.	
Course Content:		
Unit-1:	**Ratio, proportions and variations** Concept of ratios, proportions, variations, properties and their applications	5 Hours
Unit-2:	**Time and Work** Same efficiency, different efficiency, alternate work, application in Pipes and Cisterns	6 Hours
Unit-3:	**Time Speed Distance** Average speed, proportionalities in Time, Distance, trains, boats, races, circular tracks	6 Hours
Unit-4:	**Logs and Surds** Concept and properties of logs, surds and indices	4 Hours
Unit-5:	**Coding and decoding** Sequential coding, reverse coding, abstract coding	3 Hours
Unit-6:	**Syllogisms** Two statements, three statements	4 Hours
Unit-7:	**Venn diagram** Basic concept and applications	2 Hours
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	

	Value Added Course B.Sc. (H) Physics- Semester-III **Modern Algebra and Data Management**	L-2 T-1 P-0 C-0
Course Code: TMUGA-302		
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the concepts of modern mathematics Divisibility rule, Remainder Theorem, HCF /LCM in Number System.	
CO2.	Relating the rules of permutation and combination, Fundamental Principle of Counting to find the probability.	
CO3.	Applying calculative and arithmetical concepts of ratio, Average and Percentage to analyze and interpret data.	
CO4.	Correlating the various arithmetic concepts to check sufficiency of data	
Course Content:		
Unit-1:	**Number theory** Classification of Numbers, Divisibility Rules, HCF and LCM, Factors, Cyclicity(Unit Digit and Last Two digit), Remainder Theorem, Highest Power of a Number in a Factorial, Number of trailing zeroes	8 Hours
Unit-2:	**Data interpretation** Data Interpretation Basics, Bar Chart, Line Chart, Tabular Chart, Pie Chart, DI tables with missing values	7 Hours
Unit-3:	**Data Sufficiency** Introduction of Data Sufficiency, different topics based DS	5 Hours
Unit-4:	**Permutations and combinations** Fundamental counting, and or, arrangements of digits, letters, people in row, identical objects, rank, geometrical arrangements, combination: - basic, handshakes, committee, selection of any number of objects, identical and distinct, grouping and distribution, de-arrangements	6 Hours
Unit-5:	**Probability** Introduction, Probability based on Dice and Coins, Conditional Probability, Bayes Theorem	4 Hours
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	

New Course Added

Course Code: TMUGS-301	**Value Added Course** **B.Sc.(H) Physics- Semester-III** **Managing Self**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Utilizing effective verbal and non-verbal communication techniques in formal and informal settings	
CO2.	Understanding and analyzing self and devising a strategy for self growth and development.	
CO3.	Adapting a positive mindset conducive for growth through optimism and constructive thinking.	
CO4.	Utilizing time in the most effective manner and avoiding procrastination.	
CO5.	Making appropriate and responsible decisions through various techniques like SWOT, Simulation and Decision Tree.	
CO6.	Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.	
Course Content:		
Unit-1:	**Personal Development:** Personal growth and improvement in personality Perception Positive attitude Values and Morals High self motivation and confidence Grooming	10 Hours
Unit-2:	**Professional Development:** Goal setting and action planning Effective and assertive communication Decision making Time management Presentation Skills Happiness, risk taking and facing unknown	8 Hours
Unit-3:	**Career Development:** Resume Building Occupational Research Group discussion (GD) and Personal Interviews	12 Hours
Reference Books:	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education 2. Tracy, Brian, Time Management (2018), Manjul Publishing House 3. Hill, Napolean, Think and grow rich (2014), Amazing Reads 4. Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub 5. https://www.hloom.com/resumes/creative-templates/ 6. https://www.mbauniverse.com/group-discussion/topic.php 7. Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan 8. Burne, Eric, Games People Play (2010), Penguin UK 9. https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression	

Course Code: BAS331	Generic Elective –III B.Sc.(H) Physics- Semester-III **Numerical Analysis**	L-4 T-0 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding**finite differences and interpolation with equal intervals and Unequal Intervals.	
CO2.	**Understanding**introduction of operators and its properties.	
CO3.	**Applying** numerical solution of first order differential equation using Eulers,Picards and RungeKutta methods and derivative using forward and backwarddifference interpolation.	
CO4.	**Analyzing** Lagrange's interpolation formula for unequal intervals.	
CO5.	**Evaluating** Numerical differentiation and Integration, Trapezoidal Formulae, Simpson's Rule, Weddle rule and Cote's formula.	
Course Content:		
Unit-1:	Introduction of finite differences; Forward and backward differences, Forward and backward differences table, Missing term problems, General Introduction of operators and its properties.	8 Hours
Unit-2:	Interpolation with equal intervals and Unequal Intervals; Newton Gregory Forward and Backward Formula, Divided difference table, Newton's divide difference Formula, Lagrange's Interpolation Formula, Hermit Interpolation formulas using differences.	8 Hours
Unit-3:	Central difference formulae, Bessel's and Strling formula, Gauss Forward and Backward, Evertt formula.	8 Hours
Unit-4:	Numerical differentiation and Integration, Derivative using forward and backward difference interpolation formula, Trapezoidal Rule, Simposon's one-third and three-eight rules, Weddle rule and Cotes formula.	8 Hours
Unit-5:	Numerical solution of first order differential equation using Eulers, Picards and RungeKutta methods.	8 Hours
Text Book:	1. "Numerical Analysis" by PradeepNiyosi, Tata Mcgraw Hell.	
Reference Books:	1. "Numerical Analysis" by P.P. Gupta and Sanjay Gupta, Krishana PrakashanMandir. 2. "Numerical Analysis" by S.S. Sastry, Prentice Hall of India. 3. "Introduction to Numerical Analysis" by C. E. Froberg, Addition Welly Publishing Co. *Latest editions of all the suggested books are recommended.	
Additional electronic reference material	https://www.youtube.com/watch?v=6x_5R9zggIw https://www.youtube.com/watch?v=PBjGdQOghJE https://www.youtube.com/watch?v=G7p0nvtUFn0	

Course Code: BAS371	Generic Elective -III (Lab) B.Sc.(H) Physics- Semester-III Numerical Analysis (Lab)	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Remembering** the finite differences, operators and its properties.	
CO2.	**Understanding** the concepts of methods of Numerical Analysis.	
CO3.	**Applying** numerical solution of first order differential equation using Eulers, Picards and RungeKutta methods.	
CO4.	**Applying** Simpson's rule in logical operators and expressions using Matlab / Mathematica / Maple.	
CO5.	**Analyzing** Lagrange's interpolation formula for unequal intervals.	
Experiments:	Note: All experiments should be performed:	
Experiment-1:	Calculate the sum $1/1 + 1/2 + 1/3 + 1/4 + ---------+ 1/N$.	
Experiment-2:	To find the absolute value of an integer.	
Experiment-3:	Enter 100 integers into an array and sort them in an ascending order.	
Experiment-4:	Any two of the following (a) Bisection Method (b) Newton Raphson Method (c) Secant Method (d) RegulaiFalsi Method	
Experiment-5:	LU decomposition Method (vi) Gauss-Jacobi Method (vii) SOR Method or Gauss-Siedel Method	
Experiment-6:	Lagrange Interpolation or Newton Interpolation	
Experiment-7:	Simpson's rule. Note: For any of the CAS Matlab / Mathematica / Maple / Maxima etc., Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays should be introduced to the students.	
Text Book:	1. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, India.	
Reference Books:	1. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New age International Publisher, India, 5th edition. 2. C. F. Gerald and P. O. Wheatley, Applied Numerical Analysis, Pearson Education, India,7th edition. * Latest editions of all the suggested books are recommended	
Additional electronic reference material	https://www.youtube.com/watch?v=6x_5R9zggIw https://www.youtube.com/watch?v=PBjGdQOghJE https://www.youtube.com/watch?v=G7p0nvtUFn0	

Evaluation Scheme of Practical Examination:

Course Code: TMUGS-401	Value Added Course B.Sc.(H) Physics- Semester-IV **Managing Work and Others**	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Communicating effectively in a variety of public and interpersonal settings.	
CO2.	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.	
CO3.	Analyzing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.	
CO4.	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.	
CO5.	Handling difficult situations with grace, style, and professionalism.	
Course Content:		
Unit-1:	**Intrapersonal Skills:** Creativity and Innovation Understanding self and others (Johari window) Stress Management Managing Change for competitive success Handling feedback and criticism	8 Hours
Unit-2:	**Interpersonal Skills:** Conflict management Development of cordial interpersonal relations at all levels Negotiation Importance of working in teams in modern organisations Manners, etiquette and net etiquette	12 Hours
Unit-3:	**Interview Techniques:** Job Seeking Group discussion (GD) Personal Interview	10 Hours
Reference Books:	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education 2. Burne, Eric, Games People Play (2010), Penguin UK 3. Carnegie, Dale, How to win friends and influence people (2004), RHUK 4. Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan 5. Steinburg, Scott, Nettiquette Essentials (2013), Lulu.com 6. https://www.hloom.com/resumes/creative-templates/	

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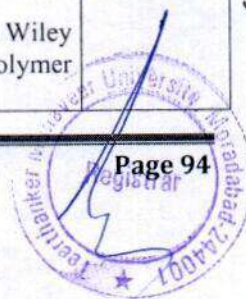| Course Code: TMUGA-402	Value Added Course B.Sc. (H) Physics- Semester-IV **Advance Algebra and Geometry**	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Recognizing the rules of Crypt-arithmetic and relate them to find out the solutions.	
CO2.	Illustrating the different concepts of Height and Distance and Functions.	
CO3.	Employing the concept of higher level reasoning in Clocks, Calendars and Puzzle Problems.	
CO4.	Correlating the various arithmetic and reasoning concepts in checking sufficiency of data.	
Course Content:		
Unit-1:	**Clocks and calendars** Introduction , Angle based , faulty Clock, Interchange of hands, Introduction of Calendars, Leap Year , Ordinary Year	5 Hours
Unit-2:	**Set theory** Introduction , Venn Diagrams basics, Venn Diagram – 3 sets, 4-Group Venn Diagrams	4 Hours
Unit-3:	**Heights and Distance** Basic concept, Word problems	3 Hours
Unit-4:	**Functions** Introduction to Functions, Even and Odd Functions, Recursive	3 Hours
Unit-5:	**Problem Solving** Introduction, Puzzle based on 3 variable, Puzzle based on 4 variable	6 Hours
Unit-6:	**Data Sufficiency** Introduction, Blood relation based, direction based, ranking based	5 Hours
Unit-7:	**Crypt Arithmetic** Introduction of Crypt Arithmetic, Mathematical operations using Crypt Arithmetic, Company Specific Pattern	4 Hours
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * **Latest editions of all the suggested books are recommended.**	

New Course Added

	Generic Elective Course-IV	L-4
Course Code: **BAS435**	**B.Sc.(H) Physics- Semester-IV** **Introduction to Probability**	T-0 P-0 C-4

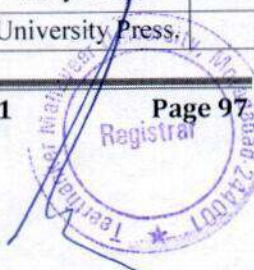| **Course Outcomes:**	On completion of the course, the students will be :	
CO1.	**Understanding** the concept of the probability, addition law of probability and multiplication law of probability with its applications.	
CO2.	**Applying** the concept of discrete and continuous random variable to calculate the moment and generating functions.	
CO3.	**Analyzing** the concept of mathematical expectation, addition and multiplication theorem of Expectation.	
CO4.	**Analyzing** the M.G.F,C.F and P.D.F of the discrete and continuous distributions.	
CO5.	**Evaluating** the concept of Probability distributions and its recurrence relation of the distribution.	
Course Content:		
Unit-1:	Probability: Introduction, sample space, events and algebra of events, Kinds of Probability: classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events.	**8 Hours**
Unit-2:	Random Variables: Discrete and continuous random variables, p.m.f, p.d.f, c.d.f. Illustrations of random variables and its properties, variance, moments and moment generating function.	**8 Hours**
Unit-3:	Mathematical Expectation- Expectation of a Random Variable, Addition & Multiplication Theorem of Expectation, Moments- Moment Generating Function, Limitations of m.g.f, cumulants - additive property.	**8 Hours**
Unit-4:	Discrete probability distributions: Bernoulli distribution : M.G.F, C.F , mean and variance, Binomial distribution : M.G.F, C.F , P,D.F, mean and variance, Poisson distribution: M.G.F, C.F , P,D.F, mean and variance.	**8 Hours**
Unit-5:	Continuous Probability Distributions: Gamma Distribution : M.G.F, C.F , P.D.F, mean and variance, Beta distribution: M.G.F, C.F , P,D.F, mean and variance, and Uniform distribution: M.G.F, C.F , P,D.F, mean and variance,	**8 Hours**
Text Books:	1. Mathematical Statistics" by S.C. Gupta, S. Chand & co.	
Reference Books:	1. Miller, Irwin and Miller, Marylees : John E. Freund's Mathematical Statistics with Applications, Pearson Education, Asia. 2. Myer, P.L.: Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi. *Latest editions of all the suggested books are recommended	
Additional electronic reference materials	1. https://www.youtube.com/watch?v=WNurLRYXJfl 2. https://www.youtube.com/watch?v=J0Yzmb_PY3Y 3. https://www.youtube.com/watch?v=lmGiViDWlJI	

Course Code: BAS434	Generic Elective- IV	L-4
		T-0
	B.Sc.(H) Physics- Semester-IV	P-0
	Polymer Chemistry	C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Remembering** the introduction & basic concepts of polymers.	
CO2.	**Understanding** the classification & properties of polymers.	
CO3.	**Understanding** the kinetics & mechanism of polymerization reaction.	
CO4.	**Understanding** the preparation & application of industrial & natural polymers.	
CO5.	**Analyzing** the molecular weight determination of polymers.	
Course Content:		
Unit-1:	**Basic Concepts:** Classification – Nomenclature and isomerism – functionality – Molecular forces and chemical bonding in polymers – Molecular weight – Linear, branched and cross-linked polymers. Thermoplastic and thermosetting polymers – Elastomers, Fibers and resins.Techniques of polymerization–emulsion, bulk, solution and suspension.	8 Hours
Unit-2:	**Kinetics and Mechanism:** Kinetics and Mechanism of polymerization – free radical, cationic, anionic and co-ordination polymerization (Ziegler - Natta Catalyst).Copolymerization – Kinetics (Detailed Study).General characterization–Kinetic chain length–degree of polymerization, chain transfer - initiators – inhibitors – retarders.	8 Hours
Unit-3:	**Structure and Properties** Structure - property relationship – Mechanical properties, Thermal properties – Glass transition temperature – Factors affecting Glass transition temperature – crystallinity and melting point – related to structure. **Polymer characterization and analysis** Crystalline nature – X-Ray diffraction – Differential Scanning Calorimetry (DSC) – Thermo Gravimetric Analysis – molecular weight determination – Osmometry (membrane), Viscosity, Ultra centrifuge and Gel Permeation Chromatography.	8 Hours
Unit-4:	**Industrial Natural Polymers:** Important industrial polymers – preparation and application of polyethylene, poly vinyl chloride, poly urethanes, polytetrafluro ethylene (TEFLON), Nafion and ion – exchange resins. Importance of natural polymers – application and structures of starch, cellulose and chitosin derivatives.	8 Hours
Unit-5:	**Specialty Polymers:** Bio polymers – biodegradable polymers – biomedical polymers – poly electrolytes - conducting polymers – high temperature and fire-retardant polymers - polymer blend – polymer composites – polymer nanocomposites – IPN inter penetrating network polymers – Electroluminescent polymers.	8 Hours
Text Book	1. F.W. Bill Meyer. Text book of polymer science, John Wiley and sons, New York. P. J. Flory. Principles of Polymer Chemistry, Cornell Press.	

B.Sc. (H) Physics Syllabus Applicable w.e.f. Academic session 2020-21

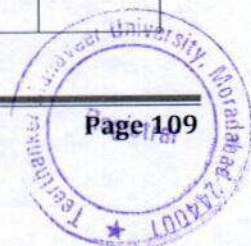| Course Code: BAS471	**Generic Elective Course-IV (Lab)** **B.Sc.(H) Physics- Semester-IV** **Polymer Chemistry (Lab)**	L-0 T-0 P-4 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the mechanical properties of Polymers.	
CO2.	**Determination** of molecular weight & hydroxyl number of polymers.	
CO3.	**Estimation** of the amount of HCHO in the given solution.	
CO4.	**Synthesizing** different types of industrial polymers.	
CO5.	**Determination** of hydroxyl number of a polymer using colorimetric method.	
Experiments:	**Note: All experiments should be performed:**	
Experiment-1:	**Polymer synthesis:** Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA). Purification of monomer Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutylonitrile (AIBN)	
Experiment-2:	Preparation of nylon 66/6	
Experiment-3:	Precipitation polymerization of acrylonitrile	
Experiment-4:	Preparation of urea-formaldehyde resin	
Experiment-5:	Preparations of novalac resin/ resold resin.	
Experiment-6:	Microscale Emulsion Polymerization of Poly(methylacrylate).	
Experiment-7:	**Polymer characterization:** Determination of molecular weight by viscometry: Polyacrylamide-aq.$NaNO_2$ solution (Poly vinyl proplylidine (PVP) in water	
Experiment-8:	Determination of the viscosity-average molecular weight of poly(vinyl alcohol) (PVOH) and the fraction of "head-to-head" monomer linkages in the polymer.	
Experiment-9:	Determination of molecular weight by end group analysis: Polyethylene glycol (PEG) (OH group).	
Experiment-10:	Testing of mechanical properties of polymers.	
Experiment-11:	Determination of hydroxyl number of a polymer using colorimetric method.	
Experiment-12:	**Polymer analysis:** Estimation of the amount of HCHO in the given solution by sodium sulphite method	
Text Book	M.P. Stevens, Polymer Chemistry: An Introduction, Oxford University Press	
Reference	1. M.P. Stevens, Polymer Chemistry: An Introduction, Oxford University Press.	

Course Code: BAS472	Generic Elective -IV (Lab) B.Sc.(H) Physics- Semester-IV **Statistical Package for Social Sciences (Lab)**	L-0 T-0 P-4 C-2
Course Outcomes :	On completion of the course, the students will be:	
CO1.	**Understanding** the concept of data analysis, general description, functions, menus and commands.	
CO2.	**Understanding** the different type of variables as well as computing new variables.	
CO3.	**Understanding** the concept of Descriptive analysis of data , creating & editing graphs.	
CO4.	**Applying** the Statistical test (Paramatric& non parametric) for independent samples, paired samples.	
CO5.	**Evaluating** the correlation and regression analysis and cluster sampling.	
Course Content:		
Unit-1:	**Introduction to SPSS: Definition of SPSS, Uses and its application in mathematics & Statistics,** Data analysis with SPSS: General aspects, discrete and continuous data, Primary and secondary data, variable, output, and syntax view; General description, data editing factor: completeness of data, consistency of data, homogeneity of data, functions, menus.	8 Hours
Unit-2:	**Input and data management:** Defining variables; Entering and modifying data: manual and automated input of data, and file import; Data Arrangement: Listing cases, replacing missing values, computing new variables, exploring data, selecting cases.	8 Hours
Unit-3:	**Descriptive analysis of data:** Frequencies; Descriptive Statistics: measures of central tendency, variability, deviation from normality; chi-square analyses; Charts: creating &editing graphs (Bar; histograms; scatter diagram; percentiles etc.).	8 Hours
Unit-4:	**Correlation and regression:** Correlation: Bivariate and Multiplication correlation; correlation matrix; Regression: Simple linear regression; Multiple regression analysis; Factor analysis, Cluster analysis.	8 Hours
Unit-5:	**Statistical tests:** Parametric Tests: Means; t-test (Independent samples, paired samples, and one sample tests);One-way ANOVA, two – way ANOVA, Non parametric tests: Mann-Whitney U, Wilcoxon signed-rank.	8 Hours
Text Book:	1. Pallant, Julie. "SPSS Survival Manual." 4th Ed., McGraw-Hill.	
Reference Books:	1. Cronk, Brian. "How to Use SPSS: A Step-By-Step Guide to Analysis and Interpretation." 5thEd. 2. KiranPandya, SmrutiBulsari, Sanjay Sinha, "SPSS in simple steps" Wiley/Dreamtech Press. * Latest editions of all the suggested books are recommended.	
Additional electronic reference materials	1. https://www.youtube.com/watch?v=uJJP1BB0Y24 2. https://www.youtube.com/watch?v=PrNslXgJNP8 3. https://www.youtube.com/watch?v=sjRg6W2awZs	

Course Code: BHM515	B.Sc.(H) Physics- Semester-V **Human Values & Professional Ethics**	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** the importance of value education in life and method of self-exploration.	
CO2.	**Understanding** 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration.	
CO3.	**Applying** right understanding about relationship and physical facilities.	
CO4.	**Analysing** harmony in myself, harmony in the family and society, harmony in the nature and existence.	
CO5.	**Evaluating** human conduct on ethical basis.	
Course Content:		
Unit-1:	Understanding of Morals, Values and Ethics; Introduction to Value Education- need for Value Education. Self- Exploration– content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration. Continuous Happiness and Prosperity- basic Human Aspirations. Gender Issues: Gender Discrimination and Gender Bias (home & office), Gender issues in human values, morality and ethics.	8 Hours
Unit-2:	Conflicts of Interest: Conflicts between Business Demands and Professional Ethics. Social and Ethical Responsibilities of Technologists. Ethical Issues at Workplace: Discrimination, Cybercrime, Plagiarism, Sexual Misconduct, Fraudulent Use of Institutional Resources. Intellectual Property Rights and its uses. Whistle blowing and beyond, Case study.	8 Hours
Unit-3:	Harmony in the Family and Society- Harmony in Human-Human Relationship, Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman and other salient values in relationship.	8 Hours
Unit-4:	Understanding Harmony in the Nature and Existence – Whole existence as Co-existence. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.	8 Hours
Unit-5:	Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Competence in professional ethics:	8 Hours

Course Code: BAS598	B.Sc. (H)-Physics- Semester-V Industrial Training & Presentation	L-0 T-0 P-6 C-3
Course Procedure:		
	Students will have to undergo industrial training of six weeks in any industry or reputed organization after the II semester examination in summer. The evaluation of this training shall be included in the V semester evaluation.	
	The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training.	
	Students will prepare an exhaustive technical report of the training during the V semester which will be duly signed by the officer under whom training was undertaken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director/Principal of the college.	
	The student at the end of the V semester will present his report about the training before a committee constituted by the Director/Principal of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. The students guide would be a special 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 member of the committee separately in a sealed envelope to the Director/Principal.	
	The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.	
	Not more than three students would form a group for such industrial training/ project submission.	
	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 Officer-in-charge trainee in industry – 25 marks. By External examiner appointed by the University – 25 marks	
	Technical report will consist five chapter as per given format:	
Chapter 1:	Brief about organization	
Chapter 2:	Detail of business carried out by organization	
Chapter 3:	Specific contribution during the industrial training (not more than 500 words)	
Chapter 4:	Learning during the industrial training (not more than 200 words)	
Chapter 5:	Conclusion	

Course Code: BHM615	B.Sc.(H) Physics- Semester-VI **Entrepreneurship**	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be:	
CO1.	**Understanding** the concepts and skills needed to run a business successfully.	
CO2.	**Applying** the steps of project formulation and market research.	
CO3.	**Analyzing** the techno economic feasibility of a project.	
CO4.	**Analyzing** various growth strategies in small scale industry.	
CO5.	**Evaluating** breakeven point, working capital requirements, and taxes.	
Course Content:		
Unit-1:	**Entrepreneurship:** Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.	**8 Hours**
Unit-2:	**Motivation:** Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	**8 Hours**
Unit-3:	**Business:** Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	**8 Hours**
Unit-4:	**Financing and Accounting:** Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	**8 Hours**
Unit-5:	**Support to Entrepreneurs:** Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	**8 Hours**
Text Book:	1. Khanka. S.S., "Entrepreneurial Development" S. Chand & Co. Ltd., Ram Nagar, New Delhi.	
Reference Books:	1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill.	

Course Code: TMUGE101	B.Sc. (H) Physics- Semester-I English Communication – I	L-2 T-0 P-2 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Remembering and understanding of the basic of English grammar and vocabulary.	
CO2.	Understanding of the basic Communication process.	
CO3.	Applying correct vocabulary and tenses in sentences construction.	
CO4.	Analyzing communication needs and developing communication strategies using both verbal & non-verbal method.	
CO5.	Drafting applications in correct format for common issues.	
CO6.	Developing self-confidence.	
Course Content:		
Unit-1:	**Introductory Sessions** • Self-Introduction • Building Self Confidence: Identifying strengths and weakness, reasons Failure, strategies to overcome Fear of Failure • Importance of English Language in present scenario (Practice: Self-introduction session)	6 Hours
Unit-2:	**Basics of Grammar** • Parts of Speech • Tense • Subject and Predicate • Vocabulary: Synonym and Antonym (Practice: Conversation Practice)	12 Hours
Unit-3:	**Basics of Communication** • Communication: Process, Types, 7Cs of Communication, Importance & Barrier • Language as a tool of communication • Non-verbal communication: Body Language • Etiquette & Manners • Basic Problem Sounds (Practice: Pronunciation drill and building positive body language)	10 Hours
Unit-4:	**Application writing** • Format & Style of Application Writing • Practice of Application writing on common issues.	8 Hours
Unit-5:	**Value based text reading:** Short Story (Non- detailed study) • Gift of Magi - O. Henry	4 Hours
Text Book:	1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.	
Reference Books:	1. Kumar, Sanjay. & Pushp Lata. "Communication Skills" New Delhi: Oxford University Press.	

Semester I
English Communication and Soft Skills – I
[BHM199/EHM199 amended vide approval dt. July 23, 2018 of V.C]

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 students, improve their vocabulary.
4. To introduce them with basic communicative skills in real life situations

Course Outcomes: At the end of the semester, the learner will be able to
1. Remove fear of speaking in English among peers & teachers.
2. Develop the ability to speak in English (even if grammatically not perfect).
3. Use vocabulary taught for speaking and writing simple sentence for day to day conversation.
4. Use taught vocabulary for writing applications on common issues.

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.

Course Code: TMUGE201	B.Sc.(H) Physics- Semester-II **English Communication – II**	L-2 T-0 P-2 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Remembering & understanding** the basics of English Grammar and Vocabulary.	
CO2.	**Understanding** the basics of Listening, Speaking & Writing Skills.	
CO3.	**Understanding** principles of letter drafting and various types of formats.	
CO4.	**Applying** correct vocabulary and grammar in sentence construction while writing and delivering presentations.	
CO5.	**Analyzing** different types of listening, role of Audience & Locale in presentation.	
CO6.	**Drafting** Official Letters, E-Mail & Paragraphs in correct format.	
Course Content:		
Unit-1:	**Functional Grammar** **(10 hours)** • Prefix, suffix and One words substitution • Modals • Concord	**10 Hours**
Unit-2:	**Listening Skills** • Difference between listening & hearing, Process and Types of Listening • Importance and Barriers to listening	**04Hours**
Unit-3:	**Writing Skills** **(12 hours)** • Official letter and email writing • Essentials of a paragraph, • Developing a paragraph: Structure and methods Paragraph writing (100-120 words)	**12 Hours**
Unit-4:	**Strategies & Structure of Oral Presentation** **(08 hours)** • Purpose, Organizing content, Audience & Locale, Audio-visual aids, Body langauge • Voice dynamics: Five P's - Pace, Power, Pronunciation, Pause, and Pitch. • Modes of speech delivery and 5 W's of presentation	**8 Hours**
Unit-5:	**Value based text reading:** Short Essay (Non- detailed study) **(06 hours)** How should one Read a book? - Virginia Woolf	**6 Hours**
Text Book:	1. Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	

Semester II
English Communication and Soft Skills-II
[BHM249/EHM249 amended vide approval dt. July 23, 2018 of V.C]

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 GATE
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 Outcomes:
At the end of the semester, the learner will be able to
1. Learn additional 50 words apart from 50 words learnt in preceding semester (Two words/lecture)
2. Write letters effectively.
3. Acquire competence in constructing short sentences dealing day to day activities with grammatical accuracy.
4. Express themselves before class / in a group and attain proficiency in deliverance.
5. Acquire adequate knowledge of grammar to address competitive exams like GATE

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.

Registrar

Course Code: TMUGE301	B.Sc.(H) Chemistry- Semester-III **English Communication- III**	L-2 T-0 P-2 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** knowledge of grammar to face competitive exams.	
CO2.	**Understanding** advance English language by using variety of words i.e. idioms and phrase in variety of sentences in functional context.	
CO3.	**Understanding** listening for effective communication.	
CO4.	**Applying** their English grammar knowledge in day to day context.	
CO5.	**Applying** writing and comprehensive skills in English.	
CO6.	**Analyzing** Comprehending & enriching their vocabulary through prescribed text.	
Course Content:		
Unit-1:	English Grammar & Vocabulary (a) Correction of Common Errors (with recap of English Grammar with its usage in practical context.) (b) Synthesis: Simple, complex and compound sentence (c) Commonly used Idioms & phrases (Progressive learning whole semester)	14 Hours
Unit-2:	Speaking Skills (a) Art of public speaking (b) Common conversation (c) Extempore (d) Power Point Presentation (PPt) Skills: Nuances of presenting PPTs	10 Hours
Unit-3:	Comprehension Skills (a) Strategies of Reading comprehension: Four S's (b) How to solve a Comprehension (Short unseen passage: 150-200 words)	6 Hours
Unit-4:	Professional Writing (a) Preparing Notice, Agenda & Minutes of the Meeting	7 Hours
Unit-5:	Value based text reading: Short story (a) The Barber's Trade Union - Mulk Raj Anand	3 Hours
Text Book:	(d) Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	
Reference Books:	1. Wren & Martin "High School English Grammar and Composition" S.Chand & Co.Ltd., New Delhi. 2. Kumar Sanjay &Pushplata "Communication Skills" Oxford University Press, New Delhi. 3. Agrawal, Malti "Professional Communication" Krishana Prakashan Media (P) Ltd. Meerut. *Latest editions of all the suggested books are recommended.	
Additional Electronics Reference Material	1- https://www.youtube.com/watch?v=dpYltVtsS_Q 2- https://www.youtube.com/watch?v=Z8HttKW8jVE 3- https://www.youtube.com/watch?v=srn5jgr9TZo	

Semester-III
English Communication and Soft Skills-III

[BHM349/EHM349/449 amended vide approval dt. July 23, 2018 & January 23, 2019 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 Outcomes: At the end of the semester, the learners will be able to

1. Refine their usage of English grammar in day to day context.
2. Acquire adequate knowledge of grammar to address competitive exams like GATE.
3. Use advance English language by using variety of words i.e. idioms and phrase in variety of sentences in functional context.
4. Improve their listening to understand the basic content.
5. Improvise their voice modulation while reading and speaking something.
6. Enhance writing and comprehensive skills in English.
7. Present simple Power Point Presentation (PPt).
8. Proactively participate in activities in situational context (like impromptu).

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.

Course Code TMUGE401	B.Sc.(H) Physics- Semester-IV	L-2 T-0 P-2 C-3
	English Communication – IV	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Remembering** adequate knowledge of grammar and vocabulary through prescribed text to address competitive exams.	
CO2.	**Understanding** the value of listening to understand the basic content.	
CO3.	**Understanding** the usage of English grammar in day to day context.	
CO4.	**Understating** about the skills required in corporate world.	
CO5.	**Applying** writing and comprehensive skills in English.	
CO6.	**Creating** a simple proposal and report.	
Course Content:		
Unit-1:	**Vocabulary & Grammar** • Homophones and Homonyms • Correction of Common Errors (with recap of English Grammar with its usage in practical context.) • Transformation of sentences	**12 Hours**
Unit-2:	**Essence of Effective listening & speaking** • Listening short conversation/ recording (TED talks / Speeches by eminent personalities) *Critical Review of these abovementioned* • Impromptu	**5 Hours**
Unit-3:	**Professional Writing** • Proposal: Significance, Types, Structure & AIDA • Report Writing: Significance, Types, Structure& Steps towards Report writing	**8 Hours**
Unit-4:	**Job Oriented Skills** • Cover Letter • Preparing Resume and Curriculum-Vitae • Interview: Types of Interview, Tips for preparing for Interview and Mock Interview • Corporate Expectation & Professional ethics: Skills expected in corporate world.	**10 Hours**
Unit-5:	**Value based text reading:** Short story • A Bookish Topic - R.K. Narayan	**5 Hours**
Text Book:	1. Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	
Reference Books:	1. Joseph, Dr C.J. & Myall E.G. "A *Comprehensive Grammar of Current English*" Inter University Press, Delhi 2. Chaudhary Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi. 3. Kumar Sanjay &Pushplata "Communication Skills" Oxford University Press, New Delhi. ***Latest editions of all the suggested books are recommended.**	
Additional Electronics Reference Material	1- https://www.youtube.com/watch?v=dpYltVtsS_Q 2 - https://www.youtube.com/watch?v=QthdqIB0WS8 3 - https://www.youtube.com/watch?v=MrgHfK8Pcfk 4 - https://www.youtube.com/watch?v=860LtRxP3rw	

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 Outcomes: At the end of the semester, the learners will be able to
1. Formulate their CVs along with cover letter in Job oriented perspective.
2. Communicate technically in functional context.
3. Proactively participate in Job Oriented activities. (Like Interview, GD etc.)
4. Aware of the skills required in corporate world.

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.