BABA MASTNATH UNIVERSITY, ASTHAL BOHAR,
ROHTAK SCHEME OF STUDIES AND EXAMINATION
Bachelor of Technology
Scheme effective from 2022-23

SEMESTER 1st (COMMON FOR ALL BRANCHES)

Sr. No.	Category	Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
					L	T	P			Mark of Class work	Theory	Practical	Total	
1	Basic Science Course	A	BSC-PHY-103G	Semiconductor Physics	3	1	0	4	4	25	75		100	3
		B	BSC-CH-101G	Chemistry-1	3	1	0	4	4	25	75		100	3
2	Basic Science Course	C	BSC-MATH-103G	Mathematics-I	3	1	0	4	4	25	75		100	3
3	Engineering Science Course	A	ESC-EE-101G	Basic Electrical Engineering	3	1	0	4	4	25	75		100	3
	Engineering Science Course	B	ESC-CSE101G	Programming for Problem Solving	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	A	ESC-ME-101G	Engineering Graphics & Design	1	0	4	5	3	25		75	100	3
		B	ESC-ME-102G	Workshop Technology	1	0	0	1	1	25	75		100	3
5	Basic Science Course	A	BSC-PHY-113G	Physics Lab-1	0	0	3	3	1.5	25		25	50	3
		B	BSC-CH-102G	Chemistry Lab-1	0	0	3	3	1.5	25		25	50	3
6	Engineering Science Course	A	ESC-EE-102G	Basic Electrical Engineering Lab	0	0	2	2	1	25		25	50	3

		B	ESC-CSE103G	Programming in C Lab	0	0	4	4	2	25		25	50	3
7	Engineering Science Course	B	ESC-ME-103G	Manufacturing Practices Lab	0	0	4	4	2	25		25	50	3
8	Humanities and Social science including Management courses	C	HSMC-ENG-101G	English	2	0	0	2	2	25	75		100	3
								TOTAL CREDIT	**19.5**	**175/200**	**300/375**	**125/75**	**600/650**	

BABA MASTNATH UNIVERSITY ASTHAL BOHAR, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

Bachelor of Technology Scheme effective from 2022-23

SEMESTER 2nd (COMMON FOR ALL BRANCHES)

Sr. No.	Category	Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
					L	T	P			Mark of Class work	Theory	Practical	Total	
1	Basic Science Course	B	BSC-PHY-103G	Semiconductor Physics	3	1	0	4	4	25	75		100	3
		A	BSC-CH-101G	Chemistry-1	3	1	0	4	4	25	75		100	3
2	Basic Science Course	C	BSC-MATH-102G	Mathematics-II	3	1	0	4	4	25	75		100	3
3	Engineering Science Course	B	ESC-EE-101G	Basic Electrical Engineering	3	1	0	4	4	25	75		100	3
	Engineering Science Course	A	ESC-CSE101G	Programming for Problem Solving	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	B	ESC-ME-101G	Engineering Graphics & Design	1	0	4	5	3	25		75	100	3
		A	ESC-ME-102G	Workshop Technology	1	0	0	1	1	25	75		100	3
6	Basic Science Course	B	BSC-PHY-113G	Physics Lab-1	0	0	3	3	1.5	25		25	50	3
		A	BSC-CH-102G	Chemistry Lab-1	0	0	3	3	1.5	25		25	50	3
7	Engineering Science Course	B	ESC-EE-102G	Basic Electrical Engineering Lab	0	0	2	2	1	25		25	50	3

		A	ESC-CSE-103G	Programming in C Lab	0	0	4	4	2	25		25	50	3
8	Humanities and Social science including Management courses	C	HSMC-ENG-102G	Language Lab	0	0	2	2	1	25		25	50	3
9	Engineering Science Course	A	ESC-ME-103G	Manufacturing Practices Lab	0	0	4	4	2	25		25	50	3
TOTAL CREDIT									**18.5**	**200/175**	**225/300**	**175/75**	**600/500**	

Note: Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Important Notes:

1. Significance of the Course Notations used in this scheme
   C = These courses are common to both the groups (Group-A and Group –B).
   A = Other compulsory courses for Group-A.
   B = Other compulsory courses for Group-B.

I. **Mandatory Induction program**

(Please refer **Appendix-A** for guidelines. Details of Induction program also available in the curriculum of Mandatory courses.)
[Induction program for students to be offered right at the start of the first year]

3 weeks duration

Physical activity Creative Arts

Universal Human ValuesLiterary

Proficiency Modules Lectures by Eminent

People Visits to local Areas

Familiarization to Dept./Branch & Innovations

Program outcomes (POs)- Engineering & Technology

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES- B.Tech

At the end of the program

PSO1: Inculcate an ability to understand and apply the subject-specific knowledge to the practical problems in the areas of computer, electronics and communication, civil & mechanical engineering.

PSO2: Graduate will have strong fundamentals and problem solving skills to analyze, design and develop economically feasible solutions for technical and social problems.

PSO3: Enhance of competence in engineering modelling and experimental capabilities to pursue research oriented higher education.

PSO4: Graduate will be aware about the latest technology in software and hardware.

PSO5: Graduate will be exposed to industrial training giving hands on experience.

Course code	BSC-PHY-103G				
Category	Basic Science Course				
Course title	**Semiconductor Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**		**4**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT - I
Electronic Materials

Free electron theory, Density of states and energy band diagrams, bloch theorem, Kronig-Penny model and band theory, Brillouin zone in 1, 2 and 3D, Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT - II
Semiconductors

Intrinsic and extrinsic semiconductors, Electron and hole concentration at Equilibrium, Dependence of Fermi level on carrier-concentration and temperature, dependence of Carrier Concentration, Carrier generation and recombination, Carrier transport: diffusion and drift of carriers, diffusion length p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT - III
Light-Semiconductor Interaction

Optical transitions in bulk semiconductors: absorption, spontaneous emission and stimulated emission, Einstein's coefficient, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Solar cell, Exciton, Drude model.

UNIT - IV
Measurements & Engineered Semiconductor Materials

Four-point probe and van der Pauw measurements for carrier density, resistivity, hall effect and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy (Tauc's plot), absorption/transmission/Reflectance spectra.

Density of states in2D, 1D and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Hetero-junctions and associated band-diagram.

References:

1. Pierret, Semiconductor Device Fundamental,

2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Pearson Education
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-HillInc.
4. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc.
5. Kittel : Solid state Physics
6. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley
7. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York.
8. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
9. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

Course outcomes

Students will be familiar with

- Bloch theorem, Kronig-Penny model and band theory.
- Intrinsic and extrinsic semiconductors, Electron and hole concentration at Equilibrium.
- Optical transitions in bulk semiconductors: absorption, spontaneous emission and stimulated emission
- Quantum wells, wires, and dots: design, fabrication, and characterization techniques

Course code	BSC-PHY-113G				
Category	Basic Science Course				
Course title	**Semiconductor Physics Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
			3	**1.5**	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and will have to perform at least ten subject related experiments in a semester**.**

Course Outcomes:

Basic experiments on least count and error estimation (during orientation)

- To aware about the least count of vernier calliper and screw gauge and to find the thickness ofa slide using vernier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:

1. To study the forward and reverse characteristics of P-N junction diode.
2. To study the characteristics of transistor in common base configuration.
3. To study the characteristics of transistor in common emitter configuration.
4. To study the characteristics of Junction field effect (JFET) transistor.
5. To study the characteristics of Metal oxide semiconductor field effect (MOSFET) transistor.
6. To study the characteristics of Solar cell and find out the fill factor.
7. To design and study Active and Passive filters.
8. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.
9. To determine Planks constant using photocell.
10. To measure e/m of electron using helical method.
11. To find capacitance of condenser using fleshing and quenching experiment.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To find out low resistance by Carry Foster bridge.
14. To find resistance of galvanometer by post office box.
15. To compare the capacitance of two capacitors using De‘Sauty Bridge.
16. To determine the hall coefficient and the carrier concentration of the sample material by hall effect.

Course code	BSE-CHE-101G				
Category	Basic Science Course				
Course title	**Chemistry I (Theory)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**	**0**	**4**	

Duration of Exam **3 Hrs**	Class Work :-	25 Marks
	Theory Exam:-	75 Marks
	Total :-	100 Marks

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Atomic and molecular structure: Schrodinger equation(Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations(derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability.

UNIT-II

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal Compounds.

Organic reactions and synthesis of a drug molecule :Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded). Synthesis of commonly used drug molecules (Asprin & Paracetamol).

UNIT-III

Intermolecular forces: Ionic, dipolar and Van der Waals interactions. Equations of state of real gases and critical phenomena.

Water Chemistry and Corrosion: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process). Corrosion: Introduction, Types, Factor affecting corrosion and methods of prevention.

UNIT-IV

Spectroscopic techniques and applications: Basic concept of spectroscopy, Principle and Applications of different spectroscopic techniques (UV-Visible and IR spectroscopy). Nuclear magnetic resonance and magnetic resonance imaging, Elementary discussion on Flame photometry.

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.

(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay,Education.

(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell

(v)Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

(vi) Physical Chemistry, by P. W. Atkins

(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore,5th Edition.

Course outcomes

Students will be familiar with

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecularforces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecularenergy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation statesand electron affinity.

Course code	BSC-CHE-102G				
Category	Basic Science Course				
Course title	**Chemistry I (Practical)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	0	**0**	**3**	**1.5**	

Duration of Exam3 Hrs	Internal Practical :- Marks External Practical:- MarksTotal :-	25 25 50 Marks

LIST OF EXPERIMENTS:-

1 .Determination of surface tension of given liquid by drop number method.

2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwoodviscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography /Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between twoimmiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 10 experiments are to be performed by the students.

1. Each laboratory class/section shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.
3. Pre-experimental &post experimentalquiz/questions may be offered for each lab experiment to reinforce &aid comprehension of the experiment.

Suggested Books:

1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand& Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Course Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will be able to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time.
- Measure molecular/system properties such as surface tension, viscosity, conductanceof solutions, redox potentials, chloride content of water, etc.
- Synthesize a small drug molecule and analyse a salt sample.

Math-I (Calculus and Linear Algebra)BSC-MATH-103G

Course code	BSC-MATH-103G				
Category	Basic Science Course				
Course title	Math-I (Calculus and Linear Algebra)				
Scheme and Credits	L	T	P	Credits	Semester-I
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit-I

Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders, Evolutes and Involutes, Evaluationof definite and improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions, Beta and Gamma functions and L'Hospital's rule, Maxima and Minima.

Unit-II

Matrices: Matrices, Vectors: addition and scalar multiplication, Matrix multiplication, Linear systems of equations, Linear Independence, Rank of a matrix, Cramer's Rule, Inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Unit-III

Vector spaces I: Vector Space, Linear dependence of vectors, Basis, Dimension, Linear transformations(maps), Range and kernel of a linear map, Rank and nullity, Inverse of a linear transformation, Rank nullity theorem, Matrix associated with a linear map, Composition of linear maps.

Unit-IV

Vector spaces II: Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric and Orthogonal Matrices, Model Matrix, Diagonalization, Inner product spaces, Gram-Schmidt orthogonalization.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

Course Outcomes
The students will learn:

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apartfrom various applications, they will have a basic understanding of Beta and Gamma functions.
- The essential tools of matrices and linear algebra including linear transformations, eigenvalues,diagonalization and orthogonalization.

Math-II(Multivariable Calculus, Differential equations and Complex Analysis)BSC-MATH-102G

Course code	BSC-MATH-102G				
Category	Basic Science Course				
Course title	Math-II (Multivariable Calculus, Differential equations and Complex Analysis)				
Scheme and Credits	L	T	P	Credits	Semester-II
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit-I

Multivariable Integral Calculus: Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities), Triple integrals (Cartesian), Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds, Scalar/vector line integrals, Scalar surface integrals, Vector surface integrals, Theorems of Green, Gauss and Stokes.

Unit-II

Ordinary differential equations of first and higher orders: Exact differential Equation, Linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Power series solutions, Legendre polynomials, Bessel functions of the first kind, Second order linear differential equations with variable coefficients, Methods of variation of parameters, Cauchy-Euler equation.

Unit-III

Complex Variable – Differentiation: Analytic functions, Cauchy-Riemann equations (Cartesian & Polar Form), Harmonic functions, Cauchy Integral Theorem, Residue, Finding harmonic conjugate, Elementary analytic functions (exponential, trigonometric, logarithm), Conformal mappings, Mobius transformations and their properties.

Unit-IV

Complex Variable – Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof), Taylor's series, Zeros of analytic functions, Singularities, Laurent's series, Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2. Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
6. P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

Course Outcomes

The students will learn:

- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

BASIC ELECTRICAL ENGINEERING

Course Code	**ESC-EE-101G**		
Category	**Engineering Science Course**		
Course title	Basic Electrical Engineering (Theory)		
Theory	75 Marks		
Class Work	25 Marks		
Total	100 Marks		
Duration of Exam	3 Hrs		
Scheme	**L**	**T**	**P**
	3	**1**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws with their applications (Nodal and Mesh Analysis), Superposition and Norton Theorems. Star to Delta and Delta to star conversion, Time-domain analysis of first-order RL and RC circuits.

AC Circuits

Representation of sinusoidal waveforms, peak, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

UNIT II

Transformers

Principle, construction and operation of single phase transform, equivalent circuit, phasor diagram, voltage regulation, Losses and efficiency, Test-open and short circuit test, ideal and practical transformer, Auto-transformer and three-phase transformer connections.

Polyphase Circuits

Three phase balanced circuits, voltage and current relations in star and delta connections. Power Measurement by two wattmeter method.

UNIT III

Electrical Machines

Generation of rotating magnetic fields, construction, working, starting and speed control of single-phase induction motor. Construction and working of a three-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

UNIT IV

Measuring Instruments

Construction, operating and uses of moving iron type and moving coil type, induction type voltmeter, Ammeter, watt meter, energy meter.

Electrical Installations

Components of LT Switchgear: Introduction to Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries, power factor improvement and battery backup.

Suggested Text / Reference Books

(i) E. Hughes, "Electrical and Electronics Technology", Pearson Education.
(ii) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(iii) S. K Sahdev, Basic of Electrical Engineering, Pearson Education, 2015.
(iv) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(v) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
(vi) V. D. Toro, "Electrical Engineering Fundamentals", Pearson Education.

Course Outcomes:

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and Transformers.
- To study various type of measuring instruments.
- To introduce the components of low voltage electrical installations

BASIC ELECTRICAL ENGINEERING LABORATORY

Course Code	**ESC-EE-102G**		
Category	**Engineering Science Course**		
Course title	Basic Electrical Engineering (Laboratory)		
Class Work	25 Marks		
Exam	25 Marks		
Total	50 Marks		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Practical resistors, capacitors and inductors.
2. To verify KCL and KVL.
3. To verify Thevenin's and Norton theorems.
4. To verify Maximum power transfer and Superposition theorems.
5. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
6. To perform O.C. and S.C. tests of a transformer.
7. Measurement of power in a 3-phase system by two wattmeter method.
8. Measurement of power by 3 voltmeter/3 Ammeter method.
9. Measuring the response of R-L, R-C, and R-L-C circuits to a step change in voltage. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
10. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
11. Torque Speed Characteristic of shunt dc motor.
12. Speed control of dc motor.

Laboratory Outcomes

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.

Course Code	ESC-CSE-101G			
Category	Engineering Science Course			
Course title	Programming for Problem Solving			
Theory	75 Marks			
Class Work	25 Marks			
Total	100 Marks			
Duration of Exam	3 Hrs			
Scheme and Credits	**L**	**T**	**P**	**Credits**
	3	**0**	**0**	**1.5**
Pre-requisites (if any)	**-**			

Course Outcomes:

The course will enable the students:

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional ranching, iteration and recursion.
- To decompose a problem into functions
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems
- To apply programming to solve simple numerical method problems, namely differentiation offunction and simple integration.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit 1

Introduction to Programming:

Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.

C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence**.**

Unit 2

Preprocessors, Conditional and Branching Statements, Use of Brake and continue Statement, Switch statement,

Loops/ Iterative Statements**,** Types of loops, Writing and evaluation of conditionals and consequent branching

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Array of pointer, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

1.Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
2.Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E.
3. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4.Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Code	**ESC-CSE-103G**			
Category	**Engineering Science Course**			
Course title	**Programming in C Lab**			
Theory	25 Marks			
Class Work	25 Marks			
Total	50 Marks			
Duration of Exam	3 Hrs			
Scheme and Credits	**L**	**T**	**P**	**Credits**
	0	**0**	**4**	**2**
Pre-requisites (if any)	**-**			
Remarks	The lab component should have one hour of tutorial followed or preceded by laboratory assignments.			

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through aprogram
- To be able to declare pointers of different types and use them in defining self-referentialstructures.
- To be able to create, read and write to and from simple text files.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8: Recursion, structure of recursive calls
Lab 8: Recursive functions

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures

Tutorial 10: File handling:
Lab 10: File operations: To be able to create, read and write to and from simple text files.

Course Code	**ESC-ME-102G**				
Category	**ENGINEERING SCIENCE COURSE**				
Course Title	**WORKSHOP TECHNOLOGY**				
Scheme and Credits	**L**	**T**	**P**	**CREDITS**	**Semester-I /II**
	1	**0**	**0**	**1**	
Pre-Requisites(if any)					
Theory-75 Marks	**Internal Assessment-25 Marks**		**Total-100 Marks**	**Duration of Exam-3 Hrs**	

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-1

Manufacturing Processes:

Introduction to Manufacturing Processes and their Classification, additive manufacturing Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accident, Methods of Safety, First Aid, Objectives of Layout, Types of Plant Layout and their Advantages, Layout of Welding, Machine, Fitting and Foundry shop

UNIT-II

Carpentry, Fitting & Forming Processes

Basic Principle of Hot & Cold Working, Hot & Cold Working Processes, Rolling, Extrusion, Forging, Drawing, Wire Drawing and Spinning, Advantages of timber, types of timber, defects in timber, carpentry tools, classification of metals, fitting tools, fitting operations, glass cutting

UNIT-III

Casting and Machine Tools

Introduction to Casting Processes, Basic Steps in Casting Processes, Pattern: Types of Pattern and Allowances, Sand Casting: Sand Properties, Constituents and Preparation. Gating System. Melting of Metal, Cupola Furnace, Casting Defects & Remedies, plastic moulding, lathe machine, lathe operations, CNC machining, Shaper and planner machine.

UNIT-1V

Welding and Sheet Metal Work:

Introduction to welding, Classification of Welding Processes, GAS Welding : Oxy-Acetylene Welding, Resistance Welding : Spot and Seam Welding, Arc Welding : Metal Arc, TIG & MIG, Welding Defects and Remedies, Soldering & Brazing, Metal used in sheet metal work, Sheet metal tools, Sheet metal operations, Sheet metal joints and Sheet metal machines

Suggested Text/Reference Books:

(i) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",7th Edition, Pearson Education, 2018.

(ii) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters andpublishers private limited, Mumbai.

(iii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Processes for Engineering Materials,Pearson Education.

(iv) Gowri P. Hariharan and A. Suresh Babu, “Manufacturing Technology – I” Pearson Education, 2008.
(v) Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Pearson Education.
(vi) Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGraw Hill House,

Course Outcomes
Upon completion of this course

- The students will gain knowledge of the different manufacturingprocesses which are commonly employed in the industry.
- To fabricate components using different materials

Course Code	**ESC-ME-103G**				
Category	**ENGINEERING SCIENCE COURSE**				
Course Title	**MANUFACTURING PRACTICES**				
Scheme and Credits	**L**	**T**	**P**	**CREDITS**	**Semester-I /II**
	0	**0**	**4**	**2**	
Pre-Requisites(if any)					
External Practical-25 Marks	**Internal Practical-25 Marks**		**Total-50 Marks**	**Duration of Exam-3 Hrs**	

List of Experiments/ Jobs

1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To perform pipe welding.
8. To study plastic moulding and glass cutting process
9. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
10. To prepare simple engineering components/shapes by forging.
11. To prepare mold and core assembly.
12. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.
13. To prepare a job involving side and face milling on a milling
14. To study electric machines, electronic components and power tools.

Note :

At least ten experiments/jobs are to be performed/prepared by the students in the semester.

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components withtheir own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Code	ESC-ME- 101G				
Category	ENGINEERING SCIENCE COURSE				
Course Title	ENGINEERING GRAPHICS & DESIGN				
Scheme and Credits	L	T	P	CREDITS	Semester-I /II
	1	0	4	3	
Pre-Requisites(if any)					
External Practical-75 Marks	Internal Practical/Class Marks-25 Marks		Total-100 Marks	Duration of Exam-3 Hrs	

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module 2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes, Perspective projection, Parallel Projection and Oblique projection.

UNIT-II

Module 3: Projections of Regular Solids and development of Surfaces

Cylinder, Core, Pyramid & Sphere with axes parallel, perpendicular & inclined to both reference planes, Development of surface of various solids

Module 4: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

UNIT-III

Module 5: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

Module 6: Introduction to Computer – Aided Drafting (CAD)

Cartesian and Polar Co-ordinate system, Absolute and Relative Coordinate system, basic Command: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Basic Editing Command: Chamfer, Trim, Fillet, Move, Copy, Mirror, Extend, Display Command: Zoom, Pan, Redraw

UNIT-IV

Module 7: Annotations, layering & other functions

Applying dimensions to objects, applying annotations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies Drawing of Engineering objects like coupling, crankshaft, pulley.

Module 8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to buildingdrawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(iii) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

(v) (Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for Engineering practice

The student will learn :

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

Course Code	**:**	**HSMC-ENG-101G**
Category	**:**	**Humanities**
Course Title	**:**	**English Language Skills**

L	**T**	**P**	**Credits**		
2	**0**	**0**	**2**	**Internal Assessment:**	**25 Marks**
				External Assessment:	**75 Marks**
				Total Marks:	**100 Marks**
				Duration:	**3 Hrs.**

Course Objective:

- To equip the students with English language skills needed in academic and professional world and to inculcate human/ethical values in them
- The students will acquire basic proficiency in English with special emphasis on reading and writing skills, and writing practices along with an inclination to become better human beings.

Course Contents:

UNIT-1

Basic Writing skills

Subject Verb Agreement, Noun Pronoun Agreement, Governance of Nouns through Prepositions, Basic Verb Patterns (V, SV, SVO, SVOO, SVC, SVOC, SVOA)

UNIT-II

Vocabulary Building& Creating Grammatical Cohesion

One word substitution, Phrasal Verbs, Commonly used Idioms, Foreign words, Referring Time in Language (Tenses), Use of Active and Passive Voice

UNIT-III

Phonetics

Basic concept –Vowels, Consonants, Phonemes, Syllable, Transcription of words

UNIT-IV

Reading and Writing Practices

(a) Literary Texts:

i. "Patriotism beyond politics and Religion' by Abdul Kalam Azad
ii. "The Secret of Work" by Swami Vivekananda
iii. "An Outline of Intellectual Rubbish" by Bertrand Russell
iv. "Mother Teresa" by Khushwant Singh

(b) Writing official Letters- Issues Concerning Students' academic and social life
(c) Essay Writing
(d) Paragraph Writing

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 3 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Recommended Readings:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers andProfessionals. Pearson Education.
2. Bhatnagar, k. Manmohan.Ed. The Spectrum of Life: An Anthology of Modern Prose.Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna& Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5. Rizvi, M. Ashraf.Effective Technical Communication. McGraw Hill Education (India)Pvt. Ltd., 2014.
6. Eastwood, John.Oxford Guide to English Grammar.OUP, 2010. 7.Kumar, Sanjay and Pushp Lata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9. Hill, L.A.A Guide to Correct English.London:OUP,1965. 10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009

11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course Code	**:**	**HSMC-ENG-102G**
Category	**:**	**Humanities**
Course Title	**:**	**English Language Lab**

L	**T**	**P**	**Credits**		
0	**0**	**2**	**1**	**Internal Assessment:**	**25 Marks**
				External Assessment:	**25 Marks**
				Total Marks:	**50 Marks**
				Duration:	**3 Hrs.**

Course Outcomes:-

The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper

Note: Three hour time to each segment is recommended for instruction and practical. Scheme

of End Semester Practical Exam:

1. A small passage may be read out to the examinees and they will have to write the answers to the questions asked at the end of the passage. Questions will be short answer type.
2. Examinees may be asked to identify the sounds of phonemes in given words.
3. Examinees may be asked to introduce themselves or others, participate in role play activities in mock situations, give short responses, engage in hypothetical telephonic conversation or supply the tag questions to statements etc.
4. Examinees may also be asked to deliver speeches on given situations or makepresentation on the literary texts prescribed in Unit IV of theory paper.

Recommended Readings:

1. Bhatnagar, Nitin andMamta Bhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 2015.