HIMACHAL PRADESH TECHNICAL UNIVERSITY, HAMIRPUR- 177001
(H.P.)

Syllabus

for

Bachelor in Technology Computer Science & Engineering

As per CBCS and National Education Policy (NEP-2020)

(w.e.f. the Academic Year 2023-2024)

Department of Engineering & Technology
School of Computer Science & Engineering

Approved by the Board of Studies

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

Himachal Pradesh Technical University, Hamirpur (H.P.)

CURRICULUM (CBCS)

BACHELOR OF TECHNOLOGY (B.TECH)

1ST & 2ND SEMESTER

(COMMON TO ALLBRANCHES)

S.no	Group	Branches
1	Group-A	Civil Engg. Computer Science & Engg. Information and Technology Electronics and Communication Engg.
2	Group-B	Electrical Engg. Electrical & Electronics Engineering Mech. Engg. Textile

Group A: SEMESTER –I

S. N	Category	Subject Code	Subject	L	T	P/D	Credits	Internal Assessment IA	ESE	Subject Total
Theory:										
1	FC	PHY-111	Applied Physics	3	1	-	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	-	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	-	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	-	4	40	60	100
5	MC	EVS-111	Energy and Environment	2	2	-	3	40	60	100
6	FC	*WXX-111	Workshop	1	-	2	2	60	40	100
	Labs:							IA	ESVE	Sub. Total
1	FC	PHY-111P	Applied Physics Lab	-	-	2	1	30	20	50
2	FC	HS-111P	Communication Lab	-	-	2	1	30	20	50
3	FC	EE-111P	Electrical Engineering Lab	-	-	2	1	30	20	50
			Total				**23**			

Legend:

L -   Lecture   ESE - End Semester Examination
T -   Tutorial   FW - Documentation/ File work and presentation
P -   Practical   LP - Lab performance
CT - Class Test   ESVE - End Semester Exam. / Viva-voce Exam.
IA - Internal Assessment   MC- Mandatory Course
FC- Foundation Course

*WXX where XX is branch code- CE (Civil Engineering), CS (Computer Sci & Engg), IT (Information & Tech.), EC (Elect. Comm. & Engg)

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

Group A: SEMESTER – II

S. N	Category	Subject Code	Subject	L	T	P/D	Credits	Internal Assessment IA	ESE	SubjectTotal
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	-	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	-	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	-	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	-	4	40	60	100
5	MC	HS-112	Universal human values and Awareness About Himachal Pradesh	3	0	-	3	40	60	100
6	FC	ME-111	Engineering Graphics and Design	1	-	2	2	60	40	100
	Labs:							IA	ESVE	Sub. Total
1	FC	CHM-111P	Applied Chemistry Lab	-	-	2	1	30	20	50
2	FC	CS-111P	Computer Programming Lab	-	-	2	1	30	20	50
3	FC	EC-111P	Electronics Engineering Lab	-	-	2	1	30	20	50
5	MC	HS-122P	Holistic Health and Yoga	-	-	2	1	30	20	50
			Total				**24**			

Legend:
L -   Lecture   ESE - End Semester Examination
T -   Tutorial   FW - Documentation/File work and presentation
P -   Practical   LP - Lab performance
CT - Class Test   ESVE - End Semester Exam. / Viva-voce Exam.
IA - Internal Assessment   MC- Mandatory Course
FC- Foundation Course

*WXX where XX is branch code- CE (Civil Engineering), CS (Computer Sci & Engg), IT (Information & Tech.), EC (Elect. Comm. & Engg)

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

Group B: SEMESTER –I

S. N	Category	Subject Code	Subject	L	T	P/D	Credits	Internal Assessment IA	ESE	Subject Total
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	-	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	-	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	-	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	-	4	40	60	100
5	MC	HS- 112	Universal Human Values and Awareness about Himacha Pradesh	3	0	-	3	40	60	100
6	FC	ME-111	Engineering Graphics & Design	1	-	2	2	60	40	100
Labs:								IA	ESVE	Sub. Total
1	FC	CHM-111P	Applied Chemistry Lab	-	-	2	1	30	20	50
2	FC	CS-111P	ComputerProgramming Lab	-	-	2	1	30	20	50
3	FC	EC-111P	Electronics Engineering Lab	-	-	2	1	30	20	50
			Total				**23**			

Legend:

L - Lecture	ESE - End Semester Examination
T - Tutorial	FW - Documentation/ File work andpresentation
P - Practical	LP - Labperformance
CT - Class Test	ESVE - End Semester Exam. / Viva-voce Exam.
IA - Internal Assessment	MC- MandatoryCourse
FC- FoundationCourse	

*WXX where XX is branch code- EE (Electrical Engg.), EEE (Electrical & Electronics Engg.), ME (Mechanical Engg),
TE (Textile Engg.)

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

Group B: SEMESTER – II

S. N	Category	Subject Code	Subject	L	T	P/D	Credits	Internal Assessment IA	ESE	SubjectTotal
Theory:										
1	FC	PH-111	Applied Physics	3	1	-	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	-	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	-	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	-	4	40	60	100
5	MC	EVS-111	Energy and Environmental	2	2	-	3	40	60	100
6	FC	*WXX-111	Workshop	1	-	2	2	60	40	100
	Labs:								ESVE	Sub. Total
1	FC	PH-111P	Applied Physics Lab	-	-	2	1	30	20	50
2	FC	HS-111P	Communication Lab	-	-	2	1	30	20	50
3	FC	EE-111P	Electrical Engineering Lab	-	-	2	1	30	20	50
4	MC	HS-122P	Holistic Health and Yoga	-	-	2	1	30	20	50
			Total				**24**			

Legend:

L -   Lecture   ESE - End Semester Examination
T -   Tutorial   FW - Documentation/File work and presentation
P -   Practical   LP - Lab performance
CT - Class Test   ESVE - End Semester Exam. / Viva-voce Exam.
IA - Internal Assessment   MC- Mandatory Course
FC- Foundation Course

*WXX where XX is branch code- EE (Electrical Engg.), EEE (Electrical & Electronics Engg.), ME (Mechanical Engg). TE (Textile Engg.)

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

INSTRUCTIONS FOR THE PAPER SETTING

1. The question paper will contain of five section A, B, C, D and E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type which will cover the entire syllabus and single question with 8 subparts in case of Worskhop/Engineering Graphics & Design. Section A, B, C and D will have two questions from the respective unit of the syllabus and each question will be of 10 marks except in case of Worskhop/Engineering Graphics and Design end semester examination where each question shall be of 8 Marks. Each question may be further divided into minimum 2 questions and marks may be distributed in a such a manner that total marks of all sub question should be 10 or 8 (in case of workshop/Engineering graphics & Design). The questions in Section A, B, C and D shall have same course outcomes and level.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of the non-programable calculators are allowed.

PHY-111: APPLIED PHYSICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Theory of Relativity:** Inertial and non- inertial frames of reference, earth as an inertial frame of reference, Michelson and Morley experiment, Postulates of special theory of relativity, Galilean and Lorentz transformations, Time dilation and length contraction, Relativistic kinematics and mass-energy equivalence. **Laser:** Introduction, Characteristics of lasers, Spontaneous and stimulated emission of radiation Einstein's coefficients, Population inversion, Ruby laser, Helium -Neon lasers & Semiconductor Lasers Applications of laser in industry, Scientific and medical fields.	**10**
II	**Oscillations:** Simple harmonic motion (SHM), Differential equation of SHM, Energy of SHM, Damped and Forced Oscillations, Relaxation Time, Quality Factor, Resonance, Sharpness of Resonance. **Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and acceptance cone, Numerical aperture, Propagation Mechanism and communication in fiber, Single and Multi-Mode Fibers, Step index and Graded index fiber, Attenuation and losses, Applications of optical fibers.	**10**
III	**Quantum Mechanics:** De Broglie waves, Phase and Group velocity concept, Uncertainty principle and its applications, Wave function, Postulates of quantum mechanics, Derivation of Schrodinger equation for time independent and time dependent cases and its applications viz. Particle in one dimensional box. **X-rays:** X-rays production, hard and soft x-rays, Continuous and characteristics x-rays, Bremsstrahlung effect	**10**
IV	**Electrodynamics:** Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting vector & Poynting theorem.	**10**

Dean – Academic
H.P. Technical University
Hamirpur – 177 001, HP

| **Superconductivity:** Introduction and discovery of superconductivity, Meissner effect, Type-I and type-IIP superconductors, Isotope effect, BCS theory (qualitative), High temperature superconductors, Applications of superconductivity. | |

Text Books:
1. "Engineering Physics", H.K Malik & A.K Singh, Tata McGraw-Hill.
2. Ajoy Ghatak, "Quantum Mechanics: Theory and Applications", Tata McGraw-Hill.
3. Satya Prakash and Vibhav saluja, "Engineering Physics", Pragti Prakashan Meerut.
4. "Applied Solid State Physics", Wiley India Pvt Ltd.

Reference Books:
1. Ajoy Ghatak, "Optics", Tata McGraw-Hill.
2. N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, "Optics", S. Chand & Co. Ltd.
3. Anuradha De, "Fiber optics and laser Principles and Applications", New Age International.
4. Arthur Beiser, "Concepts of Modern Physics", Tata McGraw-Hill.
5. David J Griffiths, "Introduction to electrodynamics", Prentice Hall of India, New Delhi

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

HS-111: COMMUNICATION SKILLS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Essentials of communication:** The meaning, types &process of communication, Barriers to communication and removal of these barriers, Shannon & weaver model of communication, Berlos' model of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness, Types of information - order, advise, suggestion, motivation, persuasion, warning and education. Mass Communication –function of mass communication – Media of mass communication, Advantages and disadvantages of social media.	8
II	**Essentials of Grammar:** Types of sentences: Declarative Sentence, Imperative Sentence, Interrogative Sentence, Exclamatory Sentence, simple, compound & complex sentences, conversion of one type of sentence into other, Parts of speech, Tenses, articles and prepositions, Model Auxiliaries Types of diction, ways to improve diction, Paragraph writing.	10
III	**Technical Communication:** Report writing: Characteristics of a good report, parts & types of reports, drafting of reports. Business letters: planning a business letter, parts of a letter, classification of business letters – inviting and sending quotations, letter placing orders, letter of complaint, letter of adjustment, and letter of Job, letter negotiating a job offer and Resume writing, Drafting memorandum, notices, agenda and minutes of meeting, preparing effective e-mail messages and power-point presentations	10
IV	**Soft skills & personality development:** Soft skills: Classification of soft skills, Delivering effective presentations, Capturing audience, Impromptu speech, speech initiators, telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis., body language, Types of interviews, preparing for a job interview, Strategies for managing emotions & controlling Stress	8

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

Text Books:
1. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press.
2. Effective Communication and soft Skills, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.
3. Communicative English for Engineers and professionals, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.
4. Personality and Soft Skills by B. K. Mitra Oxford press.
5. An Introduction to Professional English and Soft Skills: by Bikram K. Das, Kalyani Samantray, Cambridge Press.
6. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

Reference Books:
1. Business Communication: Theory and Application by R.W. Lesikar and John.D. Pettit , All India Traveller Bookseller.
2. Speaking and Writing for Effective Business Communication by Francis Soundaraj Macmillan.
3. Understanding Human Communication by Ronald B. Adler and George Rodman Oxford University Press: New York.
4. Communication Skills and soft skills- An integrated approach, Kumar, Pearson Publication
5. K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
6. R.K.Bansal& J.B. Harrison, spoken English for India, Orient Longman.
7. An Introduction to Linguistics: Language, Grammar and Semantics by Pushpinder Syal and D. V. Jindal (Author) Paperback
8. Mastering Interviews and Group Discussions by Dinesh Mathur CBS
9. English Conversation Practice by Grant Taylor
10. Handbook of Practical Communication Skill by Chrissie Wright (Ed.) JAICO Books.
11. English Conversation Practice by Grant Taylor
12. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

EE-111: BASIC ELECTRICAL ENGINEERING

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**DC Circuits:** Kirchhoff's voltage and current laws; power dissipation; Voltage source and current source; Mesh and Nodal analysis; Star-delta transformation; Superposition theorem. Thevenin's theorem; Norton's theorem; Maximum power transfer theorem; Millman's theorem and Reciprocity theorem; Transient response of series RL and RC circuits.	10
II	**Steady state analysis of DC Circuits:** The ideal capacitor, permittivity; the multi-plate capacitor, variable capacitor; capacitor charging and discharging, current-voltage relationship, time-constant, rise-time, fall-time, inductor energization and de-energization, inductance current-voltage relationship, time-constant; Transient response of RL, RC and RLC Circuits.	10
III	**AC Circuits:** Sinusoidal sources, RC, RL and RLC circuits, Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Single phase AC Series and parallel circuits, power dissipation in AC circuits, power factor correction, Resonance in series and parallel circuits, Balanced and unbalanced 3 -phase circuit - voltage, current and power relations, 3-phase power measurement, Comparison of single phase and three phase supply systems. **Electromagnetism:** Electromagnetic induction, Dot convention, Equivalent inductance, Analysis of Magnetic circuits, AC excitation of magnetic circuit, Iron Losses, Fringing and stacking, applications: solenoids and relays.	10
IV	**Single Phase Transformers:** Constructional features of transformer, operating principle and applications, equivalent circuit, phasor analysis and calculation of performance indices. **Motors and Generators:** DC motor operating principle, construction, energy transfer, speed torque relationship, conversion efficiency, applications, DC generator operating principle, reversal of energy transfer, EMF and speed relationship, applications.	10

Text books:
  1. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.
  2. Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.
  3. Ritu Sahdev (2019), Basic Electrical Engineering, Khanna Book Publishing Company
  4. Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
  5. Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India

  Reference Books:
  1. Chakraborti, A., Basic Electrical Engineering, Tata McGraw–Hill (2008).
  2. Del Toro, V., Electrical Engineering Fundamentals, Prentice–Hall of
     India PrivateLimited(2004)
  3. The Beginner's Guide to Engineering, by Mary Ellen Latschar

MA -111: APPLIED MATHEMATICS-I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Sequences and Series:** Introduction to sequences and Infinite series, Tests for convergence/divergence, Limit comparison test, Ratio test, Root test, Cauchy integral test, Alternating series, Absolute convergence and conditional convergence. **Series Expansions:** Power series, Taylor & Maclaurin's series, Convergence of Taylor series, Taylor & Maclaurin's Theorem, Error estimates (one variable)	9
II	**Calculus:** Mean value theorem, Rolle's theorem, Lagrange's Cauchy mean value theorem, Application of definite integral to evaluate areas of bounded region, Arc length of a plane curve, volume of solids, surface areas of a solid revolution (Cartesian coordinates), Improper integrals, Beta and Gamma functions	9
III	**Partial Differentiation and applications:** Functions of several variables, Limits and continuity $(\delta - \epsilon \ approach)$, Partial derivatives, Euler's theorem (Homogeneous functions), Chain rule, change of variables, Jacobian, Maxima and minima by using second order derivatives, Lagrange's method of multipliers, Taylor's & Maclaurin's Theorem, Error estimation.	9
IV	**Multiple Integrals and applications:** Double integral, change of order of integration in double integral, Polar coordinates, graphing of polar curves, Change of variables (Cartesian to polar), Applications of double integrals to areas and volumes, evaluation of triple integral.	9

Textbooks:
1. Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007),9thed.
2. Stewart James, Essential Calculus; Thomson Publishers (2007), 6th ed.
3. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.

Reference Books:
1. Wider David V, Advanced Calculus: Early Transcendentals, Cengage Learning (2007).
2. Apostol Tom M, Calculus, Vol I and II, John Wiley (2003).
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons (2011) 9th Edition

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

EVS-111: ENERGY AND ENVIRONMENT

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Ecosystems:** Structure and function of an ecosystem–ecological succession–primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass. **Conventions on Climate Change:** Origin of Conference of Parties (COPs), United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC); Kyoto Protocol, Montreal Action Plan; Paris Agreement and post-Paris scenario. **Environmental issues:** Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes of Climate change, Carbon footprint.	8
II	**Air Pollution:** Origin, sources, adverse effects and preventive measures related to air pollution. Case study for air pollution (London smog, Photochemical smog, Bhopal gas tragedy). **Water Pollution:** Origin, sources, adverse effects and preventive measures related to water pollution. Case study for air pollution (Minmata tragedy, Arsenic pollution at Punjab/UP, The Ganga river pollution). **Noise Pollution:** Origin, sources, adverse effects and preventive measures related to noise pollution. **Nuclear pollution:** Origin, sources, adverse effects and preventive measures related to radioactive pollution, Case study. **Environmental protection acts:** Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act.	8
III	**Renewable and non-renewable resources**: Coal, Petroleum, Solar energy, wind energy, hydrothermal energy, nuclear energy, Tidal energy, Bioenergy etc. Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining,	8

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

	Dams and their effects on forest and tribal people. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams-benefits and problems. National green hydrogen mission. FAME India Scheme.	
IV	**Environment and Disaster:** Introduction: Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear and Chemical Terrorism. Hazards, Risks and Vulnerabilities, Vulnerability of a location and vulnerable groups, National policy on disaster Management. .	8

Text Books/References:

1. Moaveni,S., Energy, Environment and Sustainability, Cengage(2018)
2. Down to Earth, Environment Reader for Universities,CSE Publication(2018)
3. Chapman, J.L. and Reiss, M.J., Ecology Principles and Application, Cambridge University Press (LPE) (1999).
4. Eastop,T.P. and Croft, D.R., Energy Efficiency for Engineers and Technologists, Longman and Harow(2006).
5. O'Callagan, P.W., Energy Management, Mc Graw Hill Book Co.Ltd.(1993).
6. Peavy H.S. and RoweD.R. Environmental Engineering, McGraw Hill(2013)

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

WME-111: WORKSHOP

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	Introduction to Engineering Materials, and their classification; Steels, Cast Irons and their classification, their properties & applications; Wrought iron; Alloy steels: stainless steel and tool steel.	4
II	Basic Casting Processes, Casting equipment, Type and composition of Molding sands and their desirable properties; Mould making with the use of a core, applications of casting.	4
III	Non-Metallic Materials: Common types, Carpentry tools & uses of Wood, common types of Joints in wood. Fitting tools, fitting operations. Machining, Tools, Basic principles of Lathe and operations performed on it. Basic description of Shape, Planer, Drilling, Milling & Grinding.	4
1V	Introduction to Welding, classification of welding processes, Welding Tools, Introduction to Electric-Arc welding, Resistance welding, Gas-welding, types of flames and their applications.	4

Text Books:

1. Chapman, W. A. J. and Arnold, E., Vol. I & III, Viva Low, *"Workshop Technology"*, priced Student Edition.
2. Chaudhary, Hajra, "*Elements of Workshop Technology*", Media Promoters & Publishers.
3. Kalpakjian and Schmid, "*Manufacturing Processes*", Pearson

References Books:

1. H. N .Gupta, R. C. Gupta, ArunMital, "*Manufacturing Processes*", New Age
2. Raghuwanshi, B. S. Vol. I & II, "*Workshop Technology*", DhapatRai and Sons.
3. "*Manufacturing Process*", BEGEMAN, M. I. and Amsted, B. H., John Wiley.

Dean - Academic
H.P. Technical University
Hamirpur – 177 001, HP

List of experiments/jobs, a student is required to make in the workshop of Mechanical Engineering. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

1.	**Introduction:** Introduction to Need and importance of workshop, different materials to be utilizedApplications of Ferrous and Non-Ferrous metals alloys.
2.	**Carpentry Shop:** To prepare half-lap corner joint, mortise & tennon joints
3.	**Fitting Shop:** To make a job involving fitting work -drilling, tapping or dieing
4.	**Smithy Shop:** To make a job by using smithy operations such as upsetting, drawing down,punching, bending, fullering & swaging.
5.	**Welding Shop:** To prepare a simple butt and Lap welded joints.
6.	**Sheet-metal Shop:** Fabrication of Funnel, tool-box, tray etc.
7.	**Machine Shop:** To make a job on lathe involving plane turning, step turning, taper turning and threading operations
8.	**Foundry Shop:** To prepare a Mould with the use of a core and cast it.

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Computer Hardware** Peripherals of a PC and Laptop, Component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, Networking, Cable: Straight and Crossover and networking components –Hub, Switch and Router	4
II	**Software** Types of software- System and Application Text Editor, Office Tools and Document Preparation using LATEX, Online Latex Editor	3
III	**Productivity Tools** Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Layouts, inserting text objects, editing text objects, Inserting Tables, working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,	3
IV	**Operating Systems** Operating System Installing an Operating System such as Linux on Computer hardware. Virtual Machine Setting up and configuring a new Virtual Machine Setting up and configuring an existing Virtual Machine Linux Operating System and its commands: General command syntax Basic help commands Basic File system commands Date and Time Basic Filters and Text processing Basic File compression commands Miscellaneous: apt-get, vi editor	6

	Introduction of Artificial Intelligence, Machine Learning and Data Science, Cyber Security and tools- Keras, Tensorflow, Pytorch, Pandas, RStudio, Firewalls, Antivirus Software	

Text

Books
1. Computer Fundamentals, Anita Goel, Pearson Education, 2017PC Hardware Trouble Shooting Made Easy, TMH
2. HTML5 — The Beginner's Guide (Web Design Fundamentals) by Frank L. Schad
3. Operating System Concepts by Abraham Silberschatz and Peter Galvin
4. Peter Norvig and Stuart J. Russell, Artificial Intelligence: A Modern Approach, Prentice Hall, 3rd Edition.
5. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, The McGraw-Hill, 3rd Edition.
6. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.
7. Jeeva Jose, Introduction to Machine Learning, Khanna Book Publishing Company, 2020
8. Skiena, Steven S, The Data Science Design Manual, CRC press

Reference Books
1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand
2. Handbook of Computer Networks and Cyber Security: Principles and Paradigms , Brij B. Gupta, Gregorio Martinez Perez, Dharma P. Agrawal , Springer, 2019.
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

List of experiments/jobs, a student is required to make in the workshop of Computer Science and Engineering.

1.	Identification and study of peripherals of a PC and Laptop
2.	Assembling and disassembling the PC
3.	Identification and study the purpose of Networking concepts
4.	Study / Prepare a network cable: Straight Through Cables vs Crossover Cables
5.	Prepare a document/report using Microsoft Word, Power Point, Microsoft Excel
6.	Prepare professional pdf documents using LaTeX
7.	Develop the home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list
8.	Operating System installation
9.	Virtual Machine setup

10.	Linux Operating System commands	
11.	Study of AI, ML and Data Science based tools	
12.	Enabling firewall in the system	

WEEE-111/WEC-111: WORKSHOP

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Electronic materials** Definition, properties and difference of conductor, insulator and semiconductor and its energy band diagram Atomic structure of semiconductor, covalent bonds intrinsic and extrinsic semiconductor P-type and N-type semiconductor their formation and properties, majority and minority carriers.	3
II	**Cables, Connectors and Switches** CABLES: General specifications of cables- characteristic impedance, current carrying capacity, flexibility. Types of cables – SWG Single core, Multi core, Single strand, Multi strand and their types, Armored cable, shielded wires, Coaxial cables, Twisted pair, Flat ribbon cable' Teflon coated wires, Fiber cables, optical Fiber Cable CONNECTORS: General specifications of connectors- contact resistance, breakdown voltage, insulation resistance, Constructional diagram, applications of BNC, D series, Audio, Video, printer, edge, FRC, RJ 45 connectors. Constructional diagram and applications of Phone Plug & Jacks SWITCHES: Toggle switch- SPDT, DPDT, TPDT, Centre off, without center off, Rotary switch types depending on their poles and positions Rocker switch, Push button latch and non-latch, Tactile switch, Micro switch, Limit switch, DIP switch, Thumb wheel switch-BCD, Decimal, Membrane switch	5
III	**Protective devices** FUSES: Glass, Ceramic fuse, Resettable fuse, Shunt fuse- MOV, HRC fuse. RELAYS: construction, working and application of General-purpose relay, NO, NC contact, Difference between switch & relay. MCB: Construction working and applications.	3

IV	Electrical and Electronics Components	5
	RESISTORS: Resistors, classification of resistors, Materials used for resistors, maximum power rating, tolerance, temperature co-efficient, Carbon film resistors, standard Wire wound resistors, Colour Coding, LDR.	
	CAPACITORS: Materials used for capacitors, working voltage, Capacitive reactance. Coding of capacitors Fixed Capacitor types: Disc, Ceramic capacitor, Aluminium electrolytic capacitor, Variable capacitor types: Air Gang, PVC gang capacitor, Trimmer mica capacitor.	
	INDUCTORS: Air core, iron core, ferrite core inductor, frequency range Inductors-A.F., R.F., I.F., toroidal Inductor	
	TRANSFORMERS IN ELECTRONIC CIRCUITS: Use of diodes and Special Diodes: Zener diode, Tunnel diode, Varactor diode, LED, photo diode, Schotty diode, PIN diode.	

Text Books
1. Dhir S.M., "Electronic Components and Materials", Tata McGraw Hills publishing company Ltd., N.Delhi ISBN: 0074630822.
2. K.B. Raina, Dr. S.K. Bhattacharya, "Electrical Engineering Materials & Electronic Components", 10th edition, S.K. Kataria & Sons, 2021.
3. Thomas H. Jones, "Electronic Components Handbook", Reston Publishing Company, 2008.
4. Charles A. Harper, "Handbook of Components for Electronics", Laxmi Enterprise, 2020.
5. Grover &Jamwal, "Electronic Components and Materials", Dhanpat Rai & Sons.

Reference Books
1. Sedha R.S, "Text book of Applied Electronics", S. Chand.
2. Hughes, "Electrical and Electronic Technology", Pearson Education.
3. V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering," Second Edition, McGraw Hill.
4. Parker and Smith, "Problems in Electrical Engineering", CBS Publishers and Distributors.

List of Software/Learning Websites
- http://www.electronics-tutorials.com/
- http://www.efymag.com/
- http://www.electronicsforu.com
- http://www.kpsec.freeuk.com/symbol.htm
- http://en.wikipedia.org/wiki/Electronic_component

Following is the list of experiments/jobs. Minimum 10 number of practical's are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Electrical Workshop	
1.	a) Demonstrate the precautionary steps adopted in case of Electrical shocks.
	b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB with ratings.
2.	Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3.	Wiring of light/fan circuit using Two-way switches. (Staircase wiring)

4.	Wiring of Fluorescent lamps and light sockets (6A) with a power circuit for controlling power device. (16A socket)
5.	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
6.	a) Identify different types of batteries with their specifications.
	b) Demonstrate the Pipe and Plate Earthing Schemes using Charts/Site Visit.
7.	Activity: Assemble the wooden/plastic boards, switches and sockets in form of extension boards with proper wiring and pin top.
Electronics Workshop	
8.	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro - mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
9.	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Orcad, MultiSim or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
10.	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
11.	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]
12.	Overview of Arduino: Hardware and Software IDE: Installation and live projects burning such as LED Blinking, Running LEDs, Sand Glass Filling of LEDs, Decoration LEDs/LED Patterns etc.
13.	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit]
14.	Activity: Assembling of components of a basic mobile phone system and develop an ability to repair and formulate a basic Transmission and Receiving system.

WTE-111: WORKSHOP FOR TEXTILE ENGINEERING

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Internal Assessment**	**End Semester Exam**	**Total**	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Fibre and Yarn** Basic introduction to Textile Fibre, Classification of fibre. Identification of fibre. Yarn numbering. Classification of yarns. Types of yarns. Basic spinning lines for production of different types of yarns.	4
II	**Fabric and Designing** Yarn preparation. Classification of fabrics. Processes involved in preparing a fabric (Woven, Knitted or nonwoven). Introduction to the basic fabric structures.	4
III	**Chemical Processing and Finishing** Brief introduction of yarn and fabric preparation processes for colouration (Dyeing/ Printing). Introduction to various finishing processes	4
IV	**Technical Textiles** Definition and scope of Technical Textiles, Classification and features of technical textiles. Application areas of Technical Textiles.	4

Text Books
1. Textile Raw Material by Ajay Jindal and Rakesh Jindal, Abhishek Publication
2. Mishra S.P.,"A Text Book of Fibre Science and Technonogy, " NewAge International Private Ltd.
3. Gohl E P G and Valensky, "*Textile Science,*" 2nd Ed., CBS Publisher, New Delhi (1999).
4. Shenai V A, "*Textile fiber*", Vol.1, 2nd Ed., Sevak Publication, Bombay (1991)

Reference Books:
1. Pattabhiram T K, "*Essential Elements of Textile calculations*", 3rd Ed., Mahajan Publishers
2. Ahmedabad (1985).
3. Klein W, "*Manual of Textile Technology*", Vol.1, 1st Ed., The Textile Institute, Manchester (1995).
4. Trotman E R, "*Dyeing and Chemical Technology of Textile Fibres*", Charles Griffin and Co. Ltd, London (1975)

Following is the list of experiments/jobs, a student is required to make in the workshop of Textile Engineering. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Dean - Academic
H.P. Technical University
Hamirpur – 177 001, HP

1.	Identification of different natural fibres.
2.	Identification of different synthetic fibres.
3.	Determination of linear density of yarn.
4.	Analysis of various yarns structure and their basic properties.
5.	Structural analysis of woven fabrics.
6.	Structural analysis of knitted fabrics.
7.	Dyeing of cotton fabric with natural dyes.
8.	Dyeing of cotton fabric with synthetic dyes.
9.	To prepare fabric sample for printing.
10.	Characterization of various technical textiles and study of their application fields.

WCE-111: WORKSHOP FOR CIVIL ENGINEERING

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Internal Assessment**	**End Semester Exam**	**Total**	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Develop Plumbing line models & Carpentry models** Plumbing-Basic Pipe Connection using valves, couplings and elbows Practical Component · Fabricate Plumbing line model from source to distribution end. Carpentry – Sowing, Planning, and making common Joints. Practical Component · Fabricate a furniture using any carpentry joints (Chair/Table/any furniture)	**4**
II	**Develop Bar Bending Models for structural element** Bar Bending schedule of horizontal and vertical structural elements as per codal provision. Practical Component · Fabricate any one bar bending models for any structural element	**4**
III	**Construction of masonry wall** Construction of a Masonry wall without mortar using various bonds. Practical Component · Construct a Masonry brick wall using any masonry Bond	**4**
IV	**3D PRINTING** Overview of– CAD Models – Prototyping - 3 D Printing Practical Component Generating simple 3D models in CAD and 3D printing	**4**

Textbooks:

1. AutoCAD(R) Pocket Reference 8th Edition by Cheryl R. Shrock.
2. Introduction to Civil Engineering Systems – Samuel Labi
3. Dynamics of Structures by Anil K. Chopra
4. Masonry Wall Construction by A.W. Hendry

Dean - Academic
H.P. Technical University
Hamirpur – 177 001, HP

Following is the list of experiments/jobs, a student is required to make in the workshop of Civil Engineering. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

1.	Preparation of Technical report/document, Presentation, Data analysis by using MS office
2.	Preparation of simple butt and lap welded joint (metal or other)
3.	Preparation of half lap corner joint, Mortise joint and tenon joint (metal or other)
4.	Fabricate a furniture using any carpentry joints (Chair/Table/any furniture)
5.	Fabricate any one bar bending models for any structural element
6.	Fabricate Plumbing line model from source to distribution end.
7.	Construct a Masonry brick wall using any masonry Bond
8.	Construct an arch using brick masonry
9.	Sampling of latest/ advanced construction materials
10.	Generating simple 3D models in CAD and 3D printing

PHY-111P: APPLIED PHYSICS LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	2	1	30	20	50	3 hrs

NOTE: - Following is the list of experiments out of which 10 must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Laboratory Work:

1. To determine the wavelength of monochromatic light by Newton's Ring.
2. To find the wavelength of light from a given source using Michelson's interferometer.
3. To determine the wavelength of spectral lines using plane transmission grating.
4. To find the value of Planck's constant.
5. To verify Stefan's law by electrical method.
6. To determine the numerical aperture of an optical fibre.
7. To determine the attenuation & propagation losses in optical fibre.
8. To determine the height of a tower with a Sextant.
9. To determine the refractive index of a liquid by Newton's ring.
10. To determine the hall co-efficient.
11. To determine the band gap of an intrinsic semiconductor by four prove method.
12. To study the LASER beam characteristics like wavelength using diffraction grating aperture & divergence.
13. To calculate the hysteresis loss by tracing a B-H curve for a given sample.
14. To compare the capacitances of two capacitors by De'sauty Bridge.
15. To study the variation of magnetic field with distance by Stewart and Gee's apparatus.
16. To find the value of e/m for electron by helical method.

HS-111P: COMMUNICATION LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs.

NOTE: - Following is the list of experiments which must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

I	**Learning correct pronunciation**: Organs of speech, IPA symbols (consonant & vowel sounds), classification of consonants as per place & manner of articulation. finding out the correct pronunciation of words with the help of a dictionary, phonetic transcription of words presented orally, conversion of words presented through IPA symbols into normal orthography, syllable division and stress marking (in words presented in IPA form). Intona tion (rising & falling tone).
II	**Listening Skills:** Listening with a focus on pronunciation (ear-training), stress and intonation; the students will be exposed, to the following varieties of English during listening practice: Standard Indian, British and American. Learning the differences between British & American pronunciation, Listening practice of the dialogues and speeches in British & American English.
III	**Speaking Skills:** Delivering impromptu speeches, reading aloud of dialogues, poems, excerpts from plays, Situational conversations: Introducing oneself, describing a person, place, situation and event, giving instructions, making inquiries – at a bank, post-office, air-port, hospital, reservation counter etc. Mock interviews and group discussions.
IV	**Writing Skills:** Identifying common mistakes made by students in written communication and improving them, writing emails: sending and responding to emails, preparing and delivering power - point presentations, answering comprehension, translation practice (Hindi to English & vice-versa).

EE-111P: ELECTRICAL ENGINEERING LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE: - Following is the list of experiments which must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Laboratory Works:

1. To verify KVL and KCL
2. Verification of Superposition and Thevenin Theorem.
3. Verification of Maximum Power and Norton Theorem.
4. Transient analysis of RL an RC series circuits
5. To study LCR series circuit.
6. To study LCR parallel circuit.
7. Power Consumption of a Fluorescent Lamp
8. Measurement of power and power factor by two wattmeter method
9. Measurement of efficiency of a single-phase transformer by load test.
10. To study and identify various parts of DC machine

CHM-111: APPLIED CHEMISTRY

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No.of hours
I	**Water Technology:** Introduction, Sources, common impurities, Hardness, Degree of hardness and units, water quality parameters and their analysis-Turbidity, TDS, Hardness, Chlorine, Arsenic Test, BOD and COD, Water Softening -Zeolite and Ion-exchange process, Drinking water purification and domestic water purifiers. **Electrochemistry:** Specific, equivalent and molar conductivity of electrolytic solutions, Reference Electrodes-Calomel electrode and Ag-AgCl electrode, Ion-selective electrode-Glass electrode, determination of pH of solution using glass electrode, Construction and working of Batteries-Lead acid storage battery, Ni-Cd storage cell, Lithium batteries, fuel cell and Solar cell.	10
II	**Corrosion Science:** Introduction, Chemical and Electrochemical Corrosion, Theory of electrochemical corrosion, Types of Electrochemical Corrosion-Differential aeration corrosion, Pitting Corrosion. Stress Corrosion e.g., Caustic embrittlement. Factors affecting rate of corrosion-Related to metal & related to environment. Control of corrosion. **Spectroscopy Techniques:** **UV-Visible Spectroscopy**-principle, Lambert-Beer's Law, instrumentation, Electronic Transitions, Auxochromes, Chromophores, Effect of conjugation and solvents on transition of organic molecules, applications. **IR**: - Principle, Instrumentation, Fundamental vibrations, Hooke's Law, effect of masses of atoms, bond strength, nature of substituent and hydrogen bonding on Vibrational frequency, applications.	10
III	**Fuels:** Classification of fuels, Calorific value - Definition, HCV, LCV, determination of calorific value of solid and liquid fuels using Bomb calorimeter, Ultimate analysis of coal and numerical problems, Petroleum cracking -fluidized bed catalytic cracking. Reformation of petrol, Quality of liquid fuels- Cetane and	10

Dean - Academic
H.P. Technical University
Hamirpur - 177 001, HP

	Octane number, power alcohol-manufacture, advantages and disadvantages, Concept of hydrogen as fuel- types, synthesis by water electrolysis and natural gas reforming. **Chemistry in ICT**: Introduction and applications of metal and metal oxides like Si, Ge, Al,, Ti, Ni, Cu, SiO_2, La_2O_3 and ZrO_2 in communication and Display devices (liquid crystals based, LED, CRT, alumina-silicate glass based, touch screen). Disposal of harmful chemicals used in ICT; Hg, Pb, Cd and flame retardant materials.		
IV	**Engineering Materials** **Polymers:** Introduction, Classification, Glass transition temperature, factors affecting Tg and its significances, Synthesis, properties and applications of PP, PVC PMMA, polyurethanes, Epoxy resins, Silicon Rubber, PET, Lexan, Kevlar. **Conducting Polymers:** Introduction-Definition, applications, Mechanism of conduction in polyacetylene. **Nano- Materials:** Introduction, Properties of nanomaterials, Graphene, Fullerenes, Carbon nanotubes, nano wires, nano cones, Application of nano-materials.		10

Text Books:
1. Ramesh,S.and Vairam S.Engineering Chemistry,Wiley India.

2. Puri,B.R.,Sharma,L.R.,and Pathania, M.S. Principles of Physical Chemistry,Vishal Publishing Co. (2008).

3. Aggarwal,S.Engineering Chemistry: Fundamentals and Applications, Cambridge University Press(2015).

ReferenceBooks:
1. Brown,H., Chemistry for Engineering Students,Thompson.

2. Sivasankar, B., Engineering Chemistry,TataMcGraw-Hill Pub.Co.Ltd,New Delhi(2008).

3. Shulz, M. J. Engineering Chemistry,Cengage Learnings (2007).

CS-111: COMPUTER PROGRAMMING

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to C++:** C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators,), Structure of a C++ Program (include files, main function), use of I/O operators (<>), Cascading of I/O operators, compilation, linking and execution. Concept of Data types: Built-in Data types: char, int, float and double; Constants: Integer Constants, Character constants - \n, \t, \b), Floating Point Constants, String Constants; Access modifier: const; Variables of built-in-data types, Declaration/Initialization of variables, Assignment statement, Type modifier: signed, unsigned, long Operator and Expressions: Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment (++) and Decrement (--) Operators, Relation operator (>,>=,<=,=,!=), Logical operators (!,&&,||), Conditional operator: ?; Precedence of Operators; Automatic type conversion in expressions, Type casting; C++ shorthands (+=,- =,*=,/=,%=) . Conditional statements: if else, Nested if, switch case default, use of conditional operator, Nested switch case, break statement; Loops: while, do - while, for and Nested loops. Defining a function; function prototype, Invoking/calling a function: call by value, call by reference, returning values from a function, scope rules of functions and variables local and global variables.	12
II	**Array, Structure and Class**: One Dimensional Array: Declaration/initialization of One-dimensional array, inputting array elements, accessing array elements, Two dimensional Array: Declaration/initialization of a two-dimensional array, inputting array elements accessing array elements, Defining a Structure, declaring structure variables, accessing members of structure, Defining a class, declaring object and accessing class members	9
III	**Constructor and Destructor:** Constructors, Parameterized Constructors, Constructors with default arguments, Friend function, and Friend classes **Inheritance:** Derived Class declaration, Public, Private and Protected Inheritance, friend function and Inheritance, Forms of inheritance, virtual base class,Abstract class, Advantage and disadvantage of Inheritance.	9

IV	**Polymorphism:** Classification of Polymorphism, Compile time and Run time Polymorphism, Virtual function, Pure virtual functions **File Handling:** Defining and Opening a File, closing a File, reading from a File, Writing into a File. **Templates:** Need of template, Function templates **Exception Handling:** Exception handling mechanism, Catch Blocks, Catch Throw an exception,	8

Text Books:

1. The C++ Programming Language (4th Edition) By Bjarne Stroustrup
2. Lippman, S.B. and Lajoie, J., C++Primer, Pearson Education (2005) 4th ed..
3. Stroustrup, Bjarne, The C++ Programming Language, Pearson Education (2000)3rd ed.
4. Kanetkar Y., Let Us C++, BPB Publications, 2nded.
5. Balaguruswamy E., Object Oriented Programming with C++, McGraw Hill, 2013.

Reference Books:
1. Eills, Margaret A. and Stroustrup ,Bjarne, The Annonated C++ Reference Manual, Pearson Education (2002).
2. Rumbaugh, J.R., Premerlani, W. and Blaha, M., Object Oriented Modeling and Design with UML, Pearson Education (2005) 2nded.
3. Kanetkar, Yashvant, Let us C++, Jones and Bartlett Publications (2008) 8th ed.
4. Brian W. Kernighan, Dennis M. Ritchie, The C++ Programming Language, Prentice Hall)
5. Schildt H., C++: The Complete Reference, Tata Mcgraw Hill, 2

EC-111: BASIC ELECTRONICS ENGINEERING

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

Unit	Contents	No. of hours
I	**Semiconductors:** Energy band concept of materials, difference between metal, insulator and semiconductor, Intrinsic and extrinsic semiconductors (n-type & p-type), current conduction in semiconductor, Photodiode, photo-transistor, LED and seven-segment display. **Semiconductor Diodes:** p-n junction diode, Depletion layer, Energy diagrams of p-n junction and depletion region, Biasing of diode and V-I Characteristics; Rectifiers - half-wave, full-wave and bridge rectifiers; Filters - L, C, LC and π filters; Zener diode, V-I Characteristics and Zener diode as voltage regulator.	8
II	**Bipolar Junction Transistors (BJT):** Transistor operation and current components in p-n-p and n-p-n transistors, input/output characteristics of CB and CE configurations,Transistor as an Amplifier ,transistor cutoff , saturation and active regions , Transistor biasing and bias stabilization: Operating point, Stability factor, Analysis of fixed bias, collector to base bias, Emitter resistance bias circuit and self bias circuit **Field Effect Transistors (FET):** Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, MOSFET: Depletion and enhancement type MOSFET- Construction, operation and characteristics.	8
III	**Oscillators:** Introduction, Criteria for oscillation, types of oscillators Hartley, Colpitt, RC Phase shift and Wein bridge oscillators. **Operational Amplifiers:** Concept of ideal operational amplifiers, ideal operational amplifier parameters, inverting, non-inverting and unity gain amplifiers, adders and subtractor, Differentiator, integrator and Comparator operational amplifiers	8
IV	**Number System and Logic Design:** Number systems, Conversions and code, conversion of bases(decimal, binary, octal and hexadecimal numbers), addition and subtraction, Boolean algebra, logic gates (AND, OR, NAND, NOR, XOR, XNOR), concept of universal gate. **Electronic Instruments:** Operation of CRO and its applications, Signal Generator, measurement of voltage, phase and frequency using CRO.	8

Textbooks:

1. Boylestad, R. L. and Nashelsky, L., Electronic Devices & Circuit Theory, Pearson (2009).
2. M. M. Mano and M. D. Ciletti, Digital Design, Pearson, Prentice Hall, 2013.

Reference Books:

1. Milliman, J. and Halkias, C. C., Electronic Devices and Circuits, Tata McGraw Hill,2007.
2. Donald D Givone, Digital Principles and Design, McGraw-Hill, 2003.
3. John FWakerly, Digital Design: Principles and Practices, Pearson, (2000).
4. N Storey, Electronics: A Systems Approach, Pearson, Prentice   Hall, (2009).

HS-112: UNIVERSAL HUMAN VALUES AND AWARENESS ABOUT HIMACHAL PRADESH

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Introduction to Value Education:** Difference between moral and human values. Five core human values: Truth, Righteous conduct, Peace, Love and Non-violence. Classification of moral values, Value crisis in contemporary Indian society at different levels: Individual, family, Society and culture. Values in Indian constitution: Justice, liberty, equality and fraternity, Fundamental Rights under Indian constitution: Fundamental duties of Indian citizens.	8
II	**Harmony with the self, family & society:** Understanding Human being as the Co-existence of the Self and the Body, Program to ensure the health of the body Distinguishing between the Needs of the Self and the Body, living in harmony with the self, family & society, steps to achieve self-discipline. Noble Eightfold Path: Right Understanding, Thought, Speech, Action, Livelihood, Effort, Mindfulness, and Concentration.	8
III	**Understanding Mental health & emotional well-being:** Characteristics of a mentally healthy person, causes of mental-health issues in contemporary society, possible solutions to improve mental health. Emotional intelligence: elements of emotional intelligence, Advantages of higher emotional-intelligence & improving emotional intelligence, Maslow's hierarchy of needs & self-actualization.	8
IV	**Awareness about Himachal Pradesh:** General knowledge including the knowledge of different places of historic, national and cultural importance & tourist attraction, hydro power projects, industries, highways, educational and other institutions of the state, knowledge about the famous personalities from the state, currents affairs of Himachal Pradesh, history of Himachal- from medieval to present time, Geography-	8

| including the weather, borders, rivers, mountain-ranges , passes, peaks , knowledge of customs and culture of HP : including the costumes, customs, fairs and festivals etc. | |

READINGS:

Text Book and Teachers Manual

1. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Wonderland Himachal Pradesh An Encyclopedia, Jag Mohan Balokhra, H. G. Publications New Delhi .

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. The Story of Stuff (Book).
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
4. Small is Beautiful - E. F Schumacher.
5. Slow is Beautiful - Cecile Andrews
6. Economy of Permanence - J C Kumarappa
7. Bharat Mein Angreji Raj – Pandit Sunderlal
8. Rediscovering India - by Dharampal
9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
10. India Wins Freedom - Maulana Abdul Kalam Azad
11. Vivekananda - Romain Rolland(English)
12. Gandhi - Romain Rolland(English)
13. History of Himachal Pradesh (HP GK) by Rana Academy
14. Geography and Culture of Himachal Pradesh (HP GK) by Rana Academy

ME-111: ENGINEERING GRAPHICS & DESIGN

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
1	0	2	2	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Basic of Engineering graphics** Relevance of Graphics in Industry - BIS conventions and specifications - drawing sheet sizes – Lettering, Notations – Dimensioning - Scales. Line and Types of Lines. drafting method, Introduction to Computer Aided Drafting, Exposure to Solid Modelling software, 3D Drawing, Introduction to Orthographic projections - Naming views as per BIS - First angle projection method. Projection of points and projection of Straight lines. Solid modelling Software commands	4
II	**Projection Of Solids** Projections of solids. Solids in simple positions and axis inclined to one plane only. Section of solids. Section planes inclined to Horizontal Plane only. True shape of the section. (CAD Drawing)	4
III	**Isometric Projection** Concepts of isometric projection. Isometric scale, Isometric view of simple solids with sectional planes. (CAD Drawing) Isometric view of solids with multiple sectional planes	4
IV	**Development Of Surfaces And Drawing** Development of Surfaces of simple solids with simple sectional planes. Parallel line method and Radial line method only. (CAD Drawing) Drawing: PLAN and ELEVATION and Sectional elevation of objects. (CAD Drawing)	4

Text Books

1. Jeyapoovan, T., Engineering Graphics and Design, Vikas Publishing House Pvt Ltd., New Delhi, 8 th Edition, 2022.
2. P. Kannaiah, K. L. Narayana, K. Venkata Reddy, A Textbook on Engineering Drawing, BS Pub, 2016.
3. Alf Yarwood, Introduction to AutoCAD – 2D and 3D Design, Newnes Elsevier, 2011
4. Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2019.

5. Kirstie Plantenberg, Engineering Graphics Essentials, SDC Publications., fifth Edition, 2016.

Reference Books:

1. Shah, M.B. & B.C. Rana, *"Engineering Drawing and Computer Graphics"*, Pearson Education, 2008.

2. *"Engineering Drawing Practice for schools and colleges"*, Bureau of Indian Standards, New Delhi

CHM-111P: APPLIED CHEMISTRY LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE: - Following is the suggestive list of experiments. At least 9 -10 experiments must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Laboratory Work:

1. To determine the pH and conductivity of five different water samples.
2. To determine total alkalinity in a given sample of water using standard acid.
3. To determine total hardness of water using complexometric titration method.
4. To determine the amount of Chlorine (residual) in given sample of water using N/20 Sodium thiosulphate solution.
5. To determine the percentage of Chlorine in sample of bleaching powder, 10 g of which are dissolved in 500 ml of water.
6. To determine the amount of Chromium in given sample of water.
7. To determine dissolved oxygen in given sample of water.
8. To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer
9. To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer.
10. To determine surface tension of given liquid by drop number method using Stalagmometer.
11. To determine % age of moisture, volatile matter, ash and fixed carbon in given sample of coal by proximate analysis method.
12. To verify Beer's Law and apply it to find the concentration of given unknown solution by using UV-visible spectra-photometer.
13. Estimation of Copper/Iron.
14. Preparation of any of the following polymers: Phenol formaldehyde resins/Urea formaldehyde resins /Biodegradable /conducting polymer.
15. To synthesize a polymer using synthetic monomer via free radical polymerization and characterize the polymer using FTIR spectra-photometer.
16. To synthesize a semisynthetic polymer via grafting of monomer on polymeric backbone and characterize the polymer using FTIR spectra-photometer.
17. Synthesis of nano-particles of Au/Ag/NiO/ZnO/Iron Oxide.

CS-111P: COMPUTER PROGRAMMING LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE: - Following is the list of experiments which must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Laboratory work:

1. WAP for basic input/output statement and various control statements.
2. WAP to create for function and function calling methods
3. WAP to take input and display elements of 1D and 2D array.
4. WAP for structures and display the values of structure members using structure variable.
5. WAP for creating class, defining member in class and accessing member
6. WAP using various string functions in C++
7. WAP for constructor and Destructor
8. WAP for inheritance
9. WAP for friend function and friend class
10. WAP for polymorphism
11. WAP for exception handling in C++
12. WAP using template concept

EC-111P: ELECTRONICS ENGINEERING LAB

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE: - Following is the list of experiments which must be performed in the lab. The additional experiments may be performed by the respective institution depending on the infrastructure and student intake.

Laboratory Work:

1. Study of the characteristics of P-N junction diode.

2. Study of the characteristics of Zener diode

3. Study of truth tables of different logic gates (AND, OR, NAND, NOR, XOR, XNOR).

4. Familiarization with CRO.

5. DSO and Electronic Components.

6. Diodes characteristics - Input- Output and Switching.

7. BJT and MOSFET Characteristics.

8. Zener diode as voltage regulator, Rectifiers.

9. Clippers and Clampers, adder circuit implementation.

10. Multiplexer & its application, Latches/Flip- flops,up/down counters.

MA-121: APPLIED MATHEMATICS-II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Content	No. of Hours
I	**Linear Algebra:** Review of matrices, Row reduced echelon form, Inverse using Gauss Jordan method and rank of a matrix, Solution of system of linear equations, Linear spaces, Subspaces, Basis and dimension, rank -nullity theorem, Linear transformation and its matrix representation, Eigen values, Eigen vectors and Diagonalization, Cayley-Hamilton Theorem (without proof), and Quadratic form and Orthogonal transformation.	9
II	**Ordinary Differential Equations**: Review of first order differential equations, Exact differential equations, Second and higher order linear differential equations with constant coefficients, Cauchy's & Legendre's homogeneous differential equations, Variation of parameters method, Cauchy - Euler equation, Method of undetermined coefficients, Engineering applications of differential equations.	9
III	**Laplace Transform:** Definition and existence of Laplace transforms and its properties, Inverse Laplace transforms using partial fraction, properties and convolution theorem (without proof), Laplace and inverse Laplace transforms of Unit step function and Impulse function, Applications to solve initial and boundary value problems.	9
IV	**Fourier Series**: Introduction, Fourier series on arbitrary intervals, Even Odd functions, Half range expansions, Parseval's theorem, Complex Fourier series, Harmonic analysis. **Vector calculus:** Introduction to vectors, Vector addition and multiplication, Directional derivatives, gradient, divergence & curl with properties, Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Green, Stokes and Gauss divergence theorem (without proof).	9

Text Books:

1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.
2. *B.S. Grewal, "Higher Engineering Mathematics"*, Khanna Publishers.
3. H.K. Dass and Rama Verma, "*Engineering Mathematics"*, S. Chand Publications.

Reference Books:

1. N.P. Bali and Manish Goel, *"Engineering Mathematics*", Laxmi Publications
2. B.V. Ramana, *"Higher Engineering Mathematics",* Tata McGraw Hill Education Pvt.Ltd., New Delhi

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

COURSE CONTENT:

1.	**Introduction:**
	Introduction of Yoga, Different Definitions of Yoga. General Guidelines for YogicPractices
2.	**Traditional Schools of Yoga:**
	(Bhakti yoga, karma yoga, Gyana yoga, Hatha yoga, Mantra yoga,Laya yoga, Raja yoga) Ashtanga Yoga of Sage Patanjali.
3.	**Concept of Shatkriyas:**
	Dhauti, Basti, Neti, Nauli, Trataka and Kapalbhati. Shatkriyas (Cleansing Process): Jala neti, Sutra neti. Kunjala, Vastra Dhauti, Danda Dhauti, kapalbhati, Surya namaskar.
4.	**Concept of Surya namaskar:**
	Introduction, Technique, benefit, precaution.
5.	**Concept of Asanas**
	Introduction, Types, Technique, benefit, precaution, **Asanas:** **1. Standing Poses:** Tadasana, Kati chakrasana, tiryak tadasana, vrikshasana, veer bhadrasana,garudasana,trikonsana, **2. Sitting Poses:** Padmasana, Swastikasana, Vajrasana, Bhadrasana, Gomukhasana,Mandukasana, Singhasana.
6.	**Concept of Pranayama:**
	Introduction, Types, Technique, benefit, precaution.
7.	**Meditation:**
	Concept, technique, benefit, and precaution. **Dhyana:** **Sthoola** Dhyana, Jyoti Dhyana, Sukshama Dhyana, (According to Gheranda Samhita). Mantra Chanting- Omkar (Pranav Jaap), Gayatri Mantra, Maha Mrityunjaya Mantra, Shanti Mantr
8.	**Lying Down Poses:**

Spine Position: uttanpadasana, Pawan muktasana, Naukasana, markatasana, halasana, sarvangasana, matsyasana, setubandhasana, chakarasana and shavasana.
Prone Position: Bhujangasana, Shalabhasana, Dhanurasana, Vipreet naukasana

Text Books:
1. BKS Iyengar (2012), Light on Yoga
2. Basvaraddi & S.P.Pathak (2016), Yogic Suksham Vyayam Evem Sthula
3. Vyayam Swami Satyananda Saraswati (2012), Asana Pranayama Mudra
4. Modern Trends and Physical Education by Prof. Ajmer Singh.