HIMACHAL PRADESH TECHNICAL UNIVERSITY HAMIRPUR

Syllabus
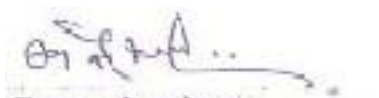
for

B.Tech. First Year

(Common to all Branches)

As per National Education Policy (NEP-2020)

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

S. No.	Group	Branches
1	Group-A	Civil Engineering Computer Science and Engineering Computer Science and Engineering (AI-ML) Computer Science and Engineering (AI-DS) Information and Technology Electronics and Communication Engineering.
2	Group-B	Electrical Engineering Electrical and Electronics Engineering Mechanical Engineering Textile Engineering

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Group A: Semester I

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	IA	ESE	Subject Total
								Evaluation Scheme (Marks)		
Theory:										
1	FC	PHY-111	Applied Physics	3	1	0	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	0	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	0	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	0	4	40	60	100
5	MC	EVS-111	Energy and Environment	2	1	0	3	40	60	100
			Labs:					IA	ESVE	Sub. Total
1	FC	PHY-111P	Applied Physics Lab	0	0	2	1	30	20	50
2	FC	HS-111P	Communication Skills Lab	0	0	2	1	30	20	50
3	FC	EE-111P	Basic Electrical Engineering Lab	0	0	2	1	30	20	50
4	FC	*WXX-111P	Workshop	0	0	4	2	30	20	50
			Total	14	04	10	23			700

Group A: Semester II

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	IA	ESE	Subject Total
								Evaluation Scheme (Marks)		
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	0	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	0	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	0	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	0	4	40	60	100
5	MC	UHV-111	Universal Human Values and Awareness About Himachal Pradesh	3	0	0	3	40	60	100
	Labs:							IA	ESVE	Sub. Total
1	FC	CHM-111P	Applied Chemistry Lab	0	0	2	1	30	20	50
2	FC	CS-111P	Computer Programming Lab	0	0	2	1	30	20	50
3	FC	EC-111P	Basic Electronics Engineering Lab	0	0	2	1	30	20	50
4	FC	ME-111P	Engineering Graphics and Design	0	0	4	2	30	20	50
5	MC	HS-122P	Holistic Health and Yoga	0	0	2	1	30	20	50
			Total	15	03	12	24			750

Legends:

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 Science & Engineering), IT (Information & Technology), EC (Elect. Comm. & Engineering)

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Group B: Semester I

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	IA	ESE	Subject Total
								Evaluation Scheme (Marks)		
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	0	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	0	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	0	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	0	4	40	60	100
5	MC	UHV-111	Universal Human Values and Awareness about Himachal Pradesh	3	0	0	3	40	60	100
	Labs:							IA	ESVE	Sub. Total
1	FC	CHM-111P	Applied Chemistry Lab	0	0	2	1	30	20	50
2	FC	CS-111P	Computer Programming Lab	0	0	2	1	30	20	50
3	FC	EC-111P	Basic Electronics Engineering Lab	0	0	2	1	30	20	50
4	FC	ME-111P	Engineering Graphics and Design	0	0	4	2	30	20	50
			Total	15	03	10	**23**			700

Group B: Semester II

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	IA	ESE	Subject Total
								Evaluation Scheme (Marks)		
Theory:										
1	FC	PHY-111	Applied Physics	3	1	0	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	0	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	0	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	0	4	40	60	100
5	MC	EVS-111	Energy and Environmental	2	1	0	3	40	60	100
Labs:										
1	FC	PHY-111P	Applied Physics Lab	0	0	2	1	30	20	50
2	FC	HS-111P	Communication Skills Lab	0	0	2	1	30	20	50
3	FC	EE-111P	Basic Electrical Engineering Lab	0	0	2	1	30	20	50
4	MC	HS-122P	Holistic Health and Yoga	0	0	2	1	30	20	50
5	FC	*WXX-111P	Workshop	0	0	4	2	30	20	50
			Total	14	04	12	**24**			750

Legends:

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 Engineering.), EEE (Electrical & Electronics Engineering.), ME (Mechanical Engineering). TE (Textile Engineering.)

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Template for-Internal Assessment (IA Theory)

HIMACHAL PRADESH TECHNICAL UNIVERSITY
Award Sheet Theory Internal Assessment (IA)

Name of the Institution:			Distribution of Marks				
Programme:			Periodical Examinations		Teacher Assessment (Assignment discussion/ presentation/Quizzes/ Overall behavior)	Attendance	Total Marks
Subject:	Sub. Code:						
Branch:	Semester:		1st Periodical Examination	2nd Periodical Examination			
Max. Marks:	Min. Marks:						
Sr. No.	University Roll No.	Name of Student	10	10	15	05	40

Name of Internal Examiner   **Head of Dept.**

Signature……………………..………   Signature………………......

Date………………………..……..…..   Date………………………..

Note: The marks of the attendance (theory and practical) in Internal Assessment(IA) should be awarded on the basis of percentage of lectures attended as per the following details:

Sr. No	Percentage of Lecture Attended	Marks Awarded
1	From 75% to 79.9%	01
2	From 80% to 84.9%	02
3	From 85% to 89.9%	03
4	From 90% to 94.9%	04
5	Above 95%	05

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Template for-Internal Assessment (Practical/Project/Seminar/Viva-Voce)

HIMACHAL PRADESH TECHNICAL UNIVERSITY
Award Sheet Practical Internal Assessment (IA)
(Practical/Project/Seminar/Workshop)

Name of the Institution:			Distribution of Marks				
Programme:			Written/ Presentation/ Demonstration	Viva-voce	Teacher Assessment: Lab Work performance/ Report/ File Work	Attendance	Total Marks
Subject: Sub. Code:							
Branch: Semester:							
Max. Marks: Min. Marks:							
Sr. No.	University Roll No.	Name of Student	05	05	15	05	30

Name of Internal Examiner   **Head of Dept.**

Signature……………………..………   Signature………………......

Date…………………….…….…..…   Date……………………..

Template for-External Assessment (Practical/Project/Seminar/Viva-Voce)

HIMACHAL PRADESH TECHNICAL UNIVERSITY
AWARD SHEET PRACTICAL (EXTERNAL ASSESSMENT)
(Practical/Project/Seminar/Workshop)

Name of the Institute: ……………………………………………………………………………….

Programme: …………………………………………………………………………………………

Subject Name: ……………….. …………… **Subject Code:** …………………………………..

Branch: ……………………………. ……. **Semester** ………………………………………

Max Marks ………………………………….. **Min. Marks:** ……………………………………….

Sr. No.	University Roll No.	Name of Student	Marks in Figure	Marks in Words

Name of Internal Examiner: ………………   **Name of External Examiner**………………………

Signature……………………..…………………   Signature……………….............................

Date………………………….……………………   Date……………………….………………

Note: The distribution of marks would be on the basis of Task performance/written (10 marks) and viva-voce (10 marks), total=20 marks.

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Syllabus

for

Semester-I (Group A&B)

and

Semester-II (Group-A&B)

PHY-111 Applied Physics

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester	Total	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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.
Unit–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.
Unit–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
Unit-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. **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.

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

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

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HS-111 Communication Skills

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester**	**Total**	
3	0	0	3	**Maximum Marks: 40**	**Maximum Marks: 60**	**100**	**3 Hours**
				Minimum Marks: 16	**Minimum Marks: 24**	**40**	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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 ofsocial media.

Unit–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.

Unit–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

Unit-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.

Textbooks:

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

Reference Books:

- Business Communication: Theory and Application by R.W. Lesikar and John.D. Pettit , All India Traveller Bookseller.
- Speaking and Writing for Effective Business Communication by Francis Soundaraj Macmillan.
- Understanding Human Communication by Ronald B. Adler and George Rodman Oxford University

Press: New York.

- Communication Skills and soft skills- An integrated approach, Kumar, Pearson Publication
- K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
- R.K.Bansal& J.B. Harrison, spoken English for India, Orient Longman.
- An Introduction to Linguistics: Language, Grammar and Semantics by Pushpinder Syal and D. V. Jindal (Author) Paperback
- Mastering Interviews and Group Discussions by Dinesh Mathur CBS
- English Conversation Practice by Grant Taylor
- Handbook of Practical Communication Skill by Chrissie Wright (Ed.) JAICO Books.
- English Conversation Practice by Grant Taylor
- Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

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EE-111 Basic Electrical Engineering

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
				Internal Assessment	End Semester Examination	Total	
L	T	P					
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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.
Unit–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 responseof RL, RC and RLC Circuits.
Unit–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.
Unit-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 speedrelationship, applications.

Textbooks:
- Ashfaq Husain and Harroon Ashfaq Fundamental of Electrical Engineering Dhanpat Rai & Co. (P) Limited; Fourth edition, 1 January 2016
- Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.
- Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.
- Ritu Sahdev (2019), Basic Electrical Engineering, Khanna Book Publishing Company
- Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
- Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India

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

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MA-111 Applied Mathematics-I							
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	1	0	4	**Maximum Marks: 40**	**Maximum Marks: 60**	**100**	**3 Hours**
				Minimum Marks: 16	**Minimum Marks: 24**	**40**	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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)
Unit–II:
Calculus: Rolle's theorem, Lagrange's and 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
Unit–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.
Unit-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.

Textbooks:
- B. S. Grewal, Higher Engineering Mathematics by B. S. Grewal 43rd Edition (2015)
- N. P. Bali and Manish Goyal A Textbook Of Engineering Mathematics (2016)
- Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007),9thed.
- Stewart James, Essential Calculus; Thomson Publishers (2007), 6th ed.
- R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.

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

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EVS-111 Energy and Environment						
Teaching Scheme			Credit	Marks Distribution		Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
2	1	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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.

Unit–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 forair pollution (Minamata 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, Casestudy. **Environmental protection acts:** Important environmental protection acts in India – water, air (prevention and controlof pollution) act, wild life conservation and forest act.

Unit–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, 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.

Unit-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.

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

WME-111P Workshop

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1.	**Introduction:**
	Introduction to Need and importance of workshop, different materials to be utilized Applications 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.

WCS:111P/WIT:111P Workshop

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**4**	**2**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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.	Enabling firewall and setting router as wireless access point in the system
12.	Study of AI based tools.

WEE-111P/WEEE-111P/ WEC-111P Workshop

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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-111P Workshop for Textile Engineering

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1	Identification of different natural fibers.
2	Identification of different synthetic fibers.
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.

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WCE-111P Workshop for Civil Engineering							
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**4**	**2**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**2**	**1**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

PHY-111P Applied Physics Lab

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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.

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HS-111P Communication Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**2**	**1**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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). Intonation (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).

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EE-111P Basic Electrical Engineering Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	**Maximum Marks: 30**	**Maximum Marks: 20**	50	2 Hours
				Minimum Marks: 12	**Minimum Marks: 8**	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of Experiments:

1. To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL)
2. To study the V-I characteristics of an incandescent lamp.
3. Verification of Thevenin's theorem
4. Verification of Norton theorem
5. Verification of superposition and Maximum power theorem
6. To study series LCR circuit
7. To study parallel LCR circuit
8. Power consumption of a fluorescent lamp
9. Measurement of power and power factor by two wattmeter method.
10. To perform short circuit test on a single-phase transformer to calculate copper loss of the transformer.
11. To measure the single-phase power in a single phase a.c. circuit by using three ammeters.
12. To measure the single-phase power in a single phase a.c. circuit by using three voltmeters.

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CHM-111 Applied Chemistry

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	**1**	**0**	**4**	Maximum Marks: 40	Maximum Marks: 60	100	**3 Hours**
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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.
Unit–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.
Unit–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 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.
Unit-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.

Textbooks:

- Ramesh, S. and Vairam S. Engineering Chemistry, Wiley India.
- Puri, B.R., Sharma, L.R. and Pathania, M.S. Principles of Physical Chemistry, Vishal Publishing Co. (2008).
- Aggarwal, S. Engineering Chemistry: Fundamentals and Applications, Cambridge University Press(2015).

Reference Books:

- Brown, H., Chemistry for Engineering Students, Thompson.
- Sivasankar, B., Engineering Chemistry, Tata Mc Graw-Hill Pub. Co. Ltd, New Delhi(2008).
- Shulz, M. J. Engineering Chemistry, Cengage Learnings (2007).

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CS-111 Computer Programming

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	**0**	**0**	**3**	Maximum Marks: 40	Maximum Marks: 60	100	**3 Hours**
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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
Unit–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
Unit–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.
Unit-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,

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

Reference Books:
- Ajoy Eills, Margaret A. and Stroustrup, Bjarne, The Annonated C++ Reference Manual, Pearson Education (2002).

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- Rumbaugh, J.R., Premerlani, W. and Blaha, M., Object Oriented Modeling and Design with UML, Pearson Education (2005) 2nd ed.
- Kanetkar, Yashvant, Let us C++, Jones and Bartlett Publications (2008) 8th ed.
- Brian W. Kernighan, Dennis M. Ritchie, The C++ Programming Language, Prentice Hall)
- Schildt H., C++: The Complete Reference, Tata Mc Graw Hill, 2

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EC-111 Basic Electronics Engineering

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	**1**	**0**	**4**	Maximum Marks: 40	Maximum Marks: 60	100	**3 Hours**
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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, Photo diode, 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.
Unit–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.
Unit–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
Unit-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.

Textbooks:

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

Reference Books:

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

MA-121 Applied Mathematics-II

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	**1**	**0**	**4**	Maximum Marks: 40	Maximum Marks: 60	100	**3 Hours**
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-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.
Unit–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.
Unit–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.
Unit-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)

Textbooks:
- R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.
- B.S. Grewal, ―Higher Engineering Mathematics‖, Khanna Publishers.
- H.K. Dass and Rama Verma, ―Engineering Mathematics‖, S. Chand Publications.

Reference Books:
- N.P. Bali and Manish Goel, ―Engineering Mathematics‖, Laxmi Publications
- B.V. Ramana, ―Higher Engineering Mathematics‖, Tata McGraw Hill Education Pvt. Ltd., New Delhi

UHV-111 Universal Human Values and Awareness about Himachal Pradesh

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

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

Textbooks:
- 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
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Wonderland Himachal Pradesh An Encyclopedia, Jag Mohan Balokhra, H. G. Publications New Delhi

Reference Books:
- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
- Slow is Beautiful - Cecile Andrews
- Economy of Permanence - J C Kumarappa
- Bharat Mein Angreji Raj – Pandit Sunderlal
- Rediscovering India - by Dharampal
- Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- India Wins Freedom - Maulana Abdul Kalam Azad
- Vivekananda - Romain Rolland (English)

ME-111P Engineering Graphics and Design

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**4**	**2**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of experiments:

Practical numbers 1-6 shall be perform in the drawing hall with the help of different drawing instruments/tools and practical numbers 7-10 shall be performed in the Auto CAD laboratory.

1. Introduction to different types of lines, lettering, dimensioning and scales.

2. To draw the projection of points and lines.

3. To draw the projection of planes.

4. To draw the projection of solids and section of solids.

5. To draw the projection of development of surfaces.

6. To draw the isometric projections.

7. Introduction to Auto CAD (History, exploring GUI, Workspace, Coordinate System, Snap, Grid and Ortho modes) and basic commands for 2D drawings.

8. Introduction to file management, drawing & drafting settings.

9. Perform dimensioning and annotations in drawing arc, lines, angle etc.

10. Use of drawing & modify tools to make simple shapes of different 2D- drawings of projection of points, line, plane, solids, section of solid, development of surfaces and isometric projections.

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CHM-111P Applied Chemistry Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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 thiosulphatesolution.
5. To determine the percentage of Chlorine in sample of bleaching powder, 10 g of which are dissolved in 500ml 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 proximateanalysis method.
12. To verify Beer's Law and apply it to find the concentration of given unknown solution by using UV-visiblespectra-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 thepolymer using FTIR spectra-photometer.
16. To synthesize a semisynthetic polymer via grafting of monomer on polymeric backbone and characterize thepolymer using FTIR spectra-photometer.
17. Synthesis of nano-particles of Au/Ag/NiO/ZnO/Iron Oxide

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CS-111P Computer Programming Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

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.
13. WAP to create function and use function calling methods.

EC-111P Basic Electronics Engineering Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**2**	**1**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Laboratory Work:

1. Familiarization with electronics equipment (multimeters, CROs, power supply and function generators)
2. Study of the characteristics of P- N junction diode.
3. Study of the characteristics of Zener diode
4. Study of truth tables of different logic gates (AND, OR, NAND, NOR, XOR, XNOR).
5. Familiarization with CRO.
6. DSO and Electronic Components.
7. Diodes characteristics - Input- Output and Switching.
8. BJT and MOSFET Characteristics.
9. Zener diode as voltage regulator, Rectifiers.
10. Construction of an un regulated DC power supply (using a transformer, a full wave rectifier and a capacitor filter) and study of its output waveform by CRO.
11. Study of inverting and non-inverting amplifiers using op-amp
12. Study of the frequency response of any one oscillator.

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HS-122P Holistic Health & Yoga

Teaching Scheme			Credit	Marks Distribution				Duration of End Semester Examination
L	T	P		Internal Assessment	End SemesterExamination		Total	
0	0	2	1	**Maximum Marks: 30**	**Maximum Marks: 20**		50	3 Hours
				Minimum Marks: 12	**Minimum Marks: 8**		20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of Experiments:

1. Introduction of Yoga, Different Definitions of Yoga. General Guidelines for Yogic Practices
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: Standing Poses: Tadasana, Kati chakrasana, tiryak tadasana, vrikshasana, veer bhadrasana, garudasana, trikonsana, 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

Textbooks:

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