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

CURRICULUM (CBCS)

BACHELOR OF TECHNOLOGY (B.TECH)

1ST & 2ND SEMESTER

(COMMON TO ALL BRANCHES)

Dean
H.P. Technical University
Hamirpur - 177001

PREAMBLE

The curriculum of an institution of higher learning is a living entity. It evolves with time; it reflects the ever changing needs of the society and keeps pace with the growing talent of the students and the faculty. The curriculum of Himachal Pradesh Technical University, Hamirpur (HPTU) is no exception. Half a century of experience in preparing graduates in engineering and postgraduates in science for a wide variety of industries has led to creation of the new curriculum. I sincerely believe that it will meet the aspirations of all stake holders – students, faculty and the employers of the graduates and postgraduates of H.P.Technical University Hamirpur.

In the university system the curricula and syllabi represented the upper limit of the material to be covered, the teacher having no motivation for stepping outside the defined territory. The curriculum and syllabi only serve as a guideline. The teacher enjoys freedom to expand it in any direction he feels appropriate, incorporates his latest knowledge and stimulates the creative minds of the students. He experiments with new contents and new techniques. A new teaching learning paradigm is born.

Thecurriculum is the culmination of the efforts of large number of faculty members and university staff and reflects their creative contribution. In keeping with the demands of the changing times, it contains many innovative features. I sincerely hope that the faculty and students will take full advantage of the dynamic features of the curriculum and make the teaching-learning process a truly sublime experience for all.

On behalf of the Senate of HP Technical University Hamirpur, I record my appreciation of the meticulous work done by the Dr.N.N. Sharma, Dean Academic in compiling the whole curricula of different programmes in this consolidated form. I also record my personal gratitude to the members of the Senate who have lent every bit of their wisdom to make the contents truly superior.

Prof. R. L. Sharma,
Vice-Chancellor

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A. PHILOSOPHY OF CURRICULUM

1. Introduction

The Indian Higher Education Institutions (HEI‟s) are changing from the conventional course structure to Choice Based Credit System (CBCS). The choice based credit system enables vertical and horizontal mobility in learning and provides a “cafeteria‟ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

The CBCS facilitates transfer of credits earned in different departments / centers of other recognized / accredited universities or institutions of higher education in India and abroad either by studying directly or by online method. The curriculum of every programme is designed accordingly and strikes a judicious balance between the need for formal instruction and free time to think beyond the course work.

The undergraduate curriculum of HPTU Hamirpur has strived to offer both theory courses as well as laboratory and design practice in all major areas of study. It has, however, consciously avoided combining theory and laboratory classes in the same course (e.g. L-T-P = 3-0-2). It was felt that an inflexible combination of theory and laboratory components will limit the opportunity to study a wide variety of subjects and increase failure rate. Therefore, separate courses are offered for theory and laboratory components in the form of (3-0-0) or (3-1-0) theory courses and (0-0-2) laboratory courses. In order to make the time table simple and easily implementable, the variety of courses are limited to only three types – (3-0-0) 3 credits, (3-1-0) 4 credits, (2-2-0) 3 credits and (0-0-2) 1 credit. Finely split subjects, carrying one or two credits, and super heavy courses carrying 4 credits or more, have been consciously avoided to ensure easy and convenient implementation.

2. Credit System

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. In a credit system, One Credit refers to:

- One lecture hour/week/Semester for Theory Courses; and,
- Two hours/week/Semester for Lab/Practical Courses or Tutorials, and
- Four hours/ week/ Semester for project work.

Other student activities not demanding intellectual work or enabling proper assessment namely study tour and guest lecture, etc.do not carry any credits.

3. Course Structure and Credit Assignment

A typical course comprises of lectures, tutorials, practical or design practice. As stated above, separate courses are proposed for theory and laboratory.Three type of courses are proposed to be offered – (3-0-0) 3 credits, (3-1-0) 4 credits, (2-2-0) 3 credits and (0-0-2) 1 credit.

The credits assigned for different components of a course are given below in Table 1.

Table 1: Credit Values for Different Components of a Subject

Lectures (hrs/wk/Sem.)	**Tutorials (hrs/wk/Sem.)**	**Practical Work (hrs/wk/Sem.)**	***Credits* (L: T: P/D)**	**Total *Credits***
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
2	2	2	2:1:1	4
0	0	6	0:0:3	3

4. Course Load

Every student has to register for a set of courses in each semester, with the total number of their credits being limited by considering the permissible weekly contact hours (typically: 30/Week); For this, an average course load of 24 credits/semester (e.g., 6-7

subjects) is considered acceptable. A typical course load per semester is given in Table. (2).

Table 2: Typical Course Load in a Semester

No. of Courses	Credits/Course	Total Credits	Contact Hours/Week *
Two Lecture Courses	3:0:0	6	6
Two Lecture Courses	2:2:0	6	6
Two Lec + Tut Courses	3:1:0	8	10
One Elective Course	3:0:0	3	3
Two Lab Course	0:0:2	2	4
One Mandatory Course	0:0:3	2	3
Total Courses: Six + one	17:3:2	24+3	+ 30

* Widely accepted figure ~ 30 hours/week, to enable the students to engage in homework assignments, self-learning outside the Class rooms/Laboratories, Extra/Co-Curricular activities and add-on courses, if any, for their overall development.

5. Categorization of Courses

The curriculum of all the programmes has been broadly be classified into following categories:

(i) **Foundation Courses (FC):** The Foundation courses, is a set of compulsory courses required to be taken by every student in the program. These courses prepare a student for further study and focuses on the academic skills required for further study. The courses comprises of introductory modules in applied mathematics, basic sciences, engineering Sciences, humanities and social sciences and skill based courses.

(ii) **Program Core (PC):** The program core builds the best possible foundation in the chosen program, helping the students to develop the ability to think analytically, read critically, and write effectively. The program courses include Inter-

disciplinary courses and the students shall study all such courses through regular mode.

(iii) **Elective Core:** Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be discipline centric (Programme Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as Open Elective.

For example, in B.Tech programme, there are four professional elective groups; a student can choose not more than one course from each group. Overall, a student can opt for four professional elective courses which suit his/her project work in consultation with the faculty advisor/mentor. Nevertheless, two programme electives have to be selected.

Similarly, there are three open elective groups in the B.Tech programme; a student can choose not more than one course from each group. Overall, a student can to opt for three professional electives depending upon his/her interest. Nevertheless, one open elective out of the three is mandatory.

(iv) **Mandatory Courses (MC):** Mandatory courses are essentially ability and skill enhancement courses. The ability enhancement courses are wherein familiarity is considered mandatory and are recommended by the regulatory bodies such as AICTE, UGC, etc. Environmental Science, English/Communication, etc. are such courses and are mandatory for all programmes. The skill based or value-based courses on the other hand are aimed at providing hands-on-training and professional competencies to a student.

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(v) Audit Courses (AC): Audit courses are the courses offered to supplement the students' knowledge/ skills prescribed outside the range of credits.

Foundation courses shall mainly be taught during the first year of study. Limited amount of choice shall be available to departments and to students in choosing the subjects of first year.

The list of elective courses may include subjects from allied disciplines also. The course distribution will be subject to certain beneficial constraints. Sufficient open electives shall be from the area of Humanities and Social Sciences.

It is essential that the students acquire the necessary writing and presentation skills, become proficient in massive computational and data handling capacity of modern day computers (hardware and software) and related devices and develop interest in undergraduate research. In order to cater to this need, courses to enhance students Communication Skills and use of Computers and Modern Educational Technology Tools (which include MATLAB, simulation software etc.) be included as mandatory courses in all programmes.

Summer industrial training being a part of engineering education for a long time, summer internship either in industry or in an R&D organization, including educational institutes with excellent research culture must be introduced. A student must take a summer internship of minimum four weeks after fourth and/ or sixth semester. The student should have the option of choosing his/her own industry/area of interest, which may be related to their respective branch or any other service oriented task. The student is expected to submit a formal report at the end of the programme and shall be evaluated during the subsequent semester.

Seminar is introduced in the curriculum to allow students exposure to variety of topics through the medium of attending seminars. The students shall not only be expected to present seminars; they will attend seminars presented by others as per recommendation of the teacher. These will include seminars by faculty and research students in the

department and by invited experts in the same or related departments. In a semester, a student shall be required to attend 6 – 8 seminars and write 2 scientific (including popular science) articles or posters. The articles and posters will be on display in departmental libraries, web sites or in any other media for public benefit.

Project work preferably be split into two parts as Project- I and Project - II wherever possible to put greater emphasis on Undergraduate Research. A student has a choice of taking a full semester Research or Industrial Project during the last semester in which he/she is required to demonstrate his/her ability to learn current areas of research and/or industrial interest. The Research or Industrial Project shall be carried out in an identified industry/firm/organization as per the stipulated guidelines of that industry/firm/ organization and the University/ Institute.

8. Sequencing of Courses: The courses that need to be completed successfully by a student are spread over eight semesters. The adopted plan and sequencing of courses is given in Table (3). Seventh and eighth semesters have relatively lesser number of courses to allow students to take full semester research project/internship and plan for future.

Table (3): Typical Sequencing Plan for Courses:

Semester	**Subject Area Coverage**
I & II	Foundation and Mandatory courses common for all branches.
III& IV	Foundation courses and Mandatory courses if required common for all branches to be continued; Program courses in two/three groups - area wise orientation and Open electives.
V&VII	Program courses, Program elective and Open elective courses; Branch-wise Orientation; Seminar.
VIII	Program electives, Project work and Internship.

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SEMESTER –I

S. N	Category	Paper Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)				
								Internal Assessmen (IA)			ESE	Subject Total
								CT	IA	Total		
Theory:												
1	MC	HS-101	English Communication Skills	2	-	-	2	20	20	40	60	100
2	FC	MA-101	Engineering Math –I	3	1	-	4	20	20	40	60	100
3	FC	PH-101/ CH -101	Engineering Physics/ Engineering Chemistry	3	1	-	4	20	20	40	60	100
4	FC	ME-101/ EE -101	Engineering Mechanics/ Principles of Electrical Engg.	2	2	-	3	20	20	40	60	100
5	FC	CS -101/ EC -101	Computer Fundamentals and Programming in C ++/ Fundamentals of Electronics Engg.	2	2	-	3	20	20	40	60	100
6	MC	ME-102/ ME -103	Engineering Drawing & Graphics/ Workshop Technology	2	-	3	3	20	40	60	40	100
7	MC	HS-102/ HS- 103	Environmental Science/ Disaster Management	2	-	-	2	20	20	40	60	100
	Labs:							**FW**	**LP**	**Total**	**ESVE**	**Sub. Total**
1	MC/FC	HS -111/ EE- 111	Communication Lab/ Electrical Engg. Lab	-	-	2	1	10	20	30	20	50
2	FC	PH-111/ CH-111	Engineering Physics Lab/ Engineering Chemisty Lab	-	-	2	1	10	20	30	20	50
3	FC	CS -111/ EC- 111	Computer Programming Lab Electronics Engg. Lab	-	-	2	1	10	20	30	20	50
			Total	**16**	**6**	**09**	**24**					

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

Note: **Group A:**
Branches: Civil Engg., Inf. Technology, Computer Science & Engg. and Electronics & Comm. Engg.
Subjects: HS-101, MA-101, PH-101, ME-101, CS-101, ME-102, HS-102, HS- 111, PH-111, CS-111

Group B:
Branches: Mech. Engg., Automobile, Textile, Electrical Engg. and Electrical and Electronics Engg.
Subjects HS-101, MA-101, CH-101, EE-101, EC-101, ME-103, HS-103, EE- 111, CH-111, EC-111

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SEMESTER – II

S. N.	Category	Paper Code	Subject	L	T	P/D	Credit	Evaluation Scheme (Marks)				
								Internal Assessment (IA)			ESE	Subject Total
								CT	IA	Total		
Theory:												
1	MC	HS -204	Business Communication	2	-	-	2	20	20	40	60	100
2	FC	MA -202	Engineering Math –II	3	1	-	4	20	20	40	60	100
3	FC	CH-101/ PH-101	Engineering Chemistry/ Engineering Physics	3	1	-	4	20	20	40	60	100
4	FC	EE -101/ ME-101	Principles of Electrical Engg. /Engineering Mechanics	2	2	-	3	20	20	40	60	100
5	FC	EC -101/ CS -101	Fundamentals of Electronics Engg./ Introduction to Computer Fundamentals and Programming in C^{++}	2	2	-	3	20	20	40	60	100
6	FC	ME-103/ ME-102	Workshop Technology/ Engineering Drawing & Graphics	2	-	3	3	20	40	60	40	100
7	MC	HS-103/ HS- 102	Disaster Management / Environmental Science	2	-	-	2	20	20	40	60	100
	Labs:							**FW**	**LP**	**Total**	**ESVE**	**Sub. Total**
1	FC/ MC	EE- 111/ HS -111/	Electrical Engg. Lab/ Communication Lab	-	-	2	1	10	20	30	20	50
2	FC	CH-111/ PH -111	Engineering Chemistry Lab/ Engineering Physics Lab	-	-	2	1	10	20	30	20	50
3	FC	EC -111/ CS- 111	Electronics Engg. Lab/ Computer Programming Lab	-	-	2	1	10	20	30	20	50
			Total	**16**	**06**	**09**	**24**					

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

Note: **Group A:**
Branches: Civil Engg., Inf. Technology, Computer Science & Engg. and Electronics & Comm. Engg.
Subjects HS-204, MA-202, CH-101, EE-101, EC-101, ME-103, HS-103, EE- 111, CH-111, EC-111

Group B:
Branches: Mech. Engg., Automobile, Textile, Electrical Engg. and Electrical and Electronics Engg.
Subjects: HS-204, MA-202, PH-101, ME-101, CS-101, ME-102, HS-102, HS- 111, PH-111, CS-111

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SEMESTER-I

HS-101: ENGLISH 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	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Communication**: Need for effective communication, process of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness; Barriers to communication - miscommunication, physical noise; Overcoming measures.	7
II	**Essentials of Grammar**: Sentence structure; Sentence formation, Use of appropriate diction, Tenses, articles and prepositions; English Phonetics: International phonetic alphabets - Production of sounds, Classification of consonant and vowel sounds.	7
III	**Writing Skills**: Letter writing - Formal, informal and demi-official letters; Business letters - quotations, supply orders, complaints, sales, adjustment letters, etc.; Resume writing**:** Difference between bio-data, CV and resume, Cover letter, Application for job.	7
IV	**Soft skills**: Classification of soft skills, soft skills for personality development & career growth; Capturing audience, Tone, Behavior and telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis.	7

Text Books:

1. Herta A. Murphy, et al., "***Effective Business Communication",*** Tata Mc-Graw Hill: New Delhi.
2. Krishna Mohan and Meenakshi Raman, "***Effective English Communication"***, TMH.
3. B. K. Mitra, Personality and Soft Skills, Oxford press.

Reference Books:

1. R.W. Lesikar and John.D. Pettit, "***Business Communication: Theory and Application"***, All India Traveller Bookseller.
2. Francis Soundaraj, "***Speaking and Writing for Effective Business Communication"***, Macmillan.
3. Ronald B. Adler and George Rodman, "***Understanding Human Communication"***, Oxford University Press: New York.

MA-101: ENGINEERING MATHEMATIC-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	Contents	No. of hours
I	**Linear Algebra:** Review of Matrices; Linearly dependent / independent of vectors; Rank and Matrix Inverse; Linear Transformation & Matrix Representation; System of Linear Equations, Eigen values and Eigenvectors; properties of Eigen values, Diagonalization of Matrices; Jordan Canonical Form, Cayley Hamilton Theorem.	9
II	**Complex Numbers:** Roots of complex number, Real and imaginary parts of functions of a complex variables - Exponential, Circular, Hyperbolic, Logarithmic and Inverse hyperbolic functions; Summation of the series C+ iS; Limit and derivative of complex functions, Cauchy -Riemann equations, Analytic functions, Entire functions and its applications.	9
III	**Differential Calculus:** Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable; Taylor's and Maclaurin's series, Jacobian, Extrema of function of two variables, Method of undetermined multipliers. **Multiple Integrals:** Double and triple integrals and their applications, Change of order of integration, Change of variables. Application of multiple integral to surface area and volume, Beta and Gamma functions and their relationships.	9
IV	**Vector Differentiation:** Scalar and vector point functions, Gradient of a scaler field, Directional derivative, Divergence and Curl of a vector field,	9

	Laplacian and second order operators. **Vector Integration**: Line, surface and volume integrals; Vector integral theorems: Greens, Stokes and Gauss divergence theorems (Without proof) and related problems.	

Text Books:

1. Kreyszig E., "***Advanced Engineering Mathematics"***, Wiley ,9th edition.
2. B.S. Grewal, "***Higher Engineering Mathematics"***, Khanna Publishers.

Reference Books:

1. H.K. Dass and Rama Verma, ***"Engineering Mathematics",*** S. Chand Publications.
2. N.P. Bali and Manish Goel, ***"Engineering Mathematics",*** Laxmi Publications.
3. D. Kandu, ***"Engineering Mathematics",*** Neel Kamal Prakashan.
4. B.V. Ramana, ***"Higher Engineering Mathematics",*** Tata McGraw Hill Education Pvt. Ltd., New Delhi

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PH-101: ENGINEERING 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, Applications of laser in industry, Scientific and medical fields.	9
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. **Fibre Optics**: Fundamental ideas about optical fibre, 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 fibres.	9
III	**Quantum Mechanics:** De Broglie waves, Phase and Group velocity concept, Uncertainty principle andits application, Wave function, Postulates of quantum mechanics, Derivation of Schrodinger equation for time independent and time dependent cases., Particle in one dimensional box, Potential well, Simple harmonic oscillator (one dimensional and three dimensional).	8

	X-rays: X-rays production, hard and soft x-rays, Continuous and characteristics x-rays, Bremsstrahlung effect.	
IV	**Electromagnetic Waves**: Maxwell's equations, Wave equation, Plane electromagnetic waves, Longitudinal and transverse waves, Superposition, Wave packets, Two and three dimensional waves, Energy - momentum, Poynting's theorem, Electromagnetic boundary conditions. **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.	**9**

Text Books:

1. ***"Applied Solid State Physics",*** Wiley India Pvt Ltd.
2. Ajoy Ghatak, ***"Quantum Mechanics: Theory and Applications",*** Tata McGraw-Hill.
3. Satya Prakash and Vibhav saluja, ***"Engineering Physics",*** Pragti Prakashan Meerut.
4. A.S.Vasudeva, ***"Modern Engineering Physics",*** S. Chand & Co. 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.

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ME-101: ENGINEERING MECHANICS

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	-	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to engineering mechanics:** Basic concepts, Laws of motion, Principle of Transmissibility of forces; Resultants of force system: Parallogram law, Forces and components, Resultant of coplanar concurrent forces, Components of forces in space; Moment of force - Principal of moment, Coplanar applications, Couple, Resultant of any force system. **Equilibrium of Rigid Bodies:** Free body diagram, Types of supports, Equations of equilibrium, Stable equilibrium, Moments and couples, Moment of a force abount a point and about an axis, Equilibrium of planer and spacial rigid body systems.	8
II	**Friction:** Introduction, Theory of friction, Angle of friction, Laws of friction, Static and dynamic friction, Motion of bodies: Angle of repose, Angle of friction, Cone of friction, Motion on inclined rough surface, Lifting Machines: Wedge, Screw, Screw- Jack and Differential screw jack. **Centroid and Moment of Inertia:** Centroid of plane, curve, area, volume and composite bodies,Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.	8
III	**Structural Analysis**: Plane Truss, Space Truss, Difference between truss and frame, Types of truss-Perect, Redundant, Deficient, Analysis of plane truss – Method of sections, Method of joints, Graphical method.	7

	Beams: Types of beams, Statically determinate beams, Shear Force and Bending Moment in beams,Shear Force and Bending Moment diagram, Relationship between Shear Force and Bending Moment.	
IV	**Kinematics of Rigid body:** Introduction, Plane Motion of Rigid Body - Rectilinear and curvilinear translation, fixed axis rotation and general plane motion; Relative Velocity; Problems. **Kinetics of Rigid Body:** Introduction, Force, Mass and Acceleration, Equations of motion, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium; Problems.	**7**

Text Books:

1. K.L. Kumar, "***Engineering Mechanics***", Tata McGraw Hill.
2. Thimoshenko & Young , "***Engineering Mechanics***", 4th ed, Tata McGraw Hill.

Reference Books:

1. Shames and Rao, "***Engineering Mechanics: Statics and Dynamics***", Pearson.
2. Beer & Johnston, "***Vector Mechanics for Engineers",*** Tata McGrawHill.
3. Meriam, ***"Statics and Dynamics***", John Wiley & Sons.
4. R.C Hibbler, "***Statics and Dynamics***", Pearson.

CS -101: COMPUTER FUNDAMENTALS AND PROGRAMMING IN C++

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	**Computer Fundamentals:** Evolution of computers; Basics of computer and its operation; Functional Components and their interconnections, Concept of Booting. Classification of Computers. **Programming Languages**: Machine Language, Assembly Language and High Level Language; Software Concepts: Types of Software - System Software, Utility Software and Application Software; System Software: Complier, Interpreter and Assembler; Need and Functions of Operating System.	8
II	**Number System, Codes and Memories:** Binary, Octal, Decimal and Hexadecimal Number System and their Inter Conversion; BCD and ASCII Codes; Processor Clock Speed (MHz, GHz), 16 bit, 32 bit and 64 bit processors. **Storage Units:** Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, etc.; Memory Types: Cache; RAM, ROM; Secondary Memory –Internal and External storage.	8
III	**Introduction to C++:** C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators,), Structure of a C++ Program (include files, main function), Header files - iostream.h, iomanip.h, cout, cin; use of I/O operators (<<and>>), Use of endl and setw (), Cascading of I/O operators, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution. **Concept of Data types:** Built-in Data types: char, int, float and double;	10

	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 (!,&&,II), Conditional operator: <condition>?<if false>; Precedence of Operators; Automatic type conversion in expressions, Type casting; C++ shorthands (+=,- =,*=,/=,%=) .	
IV	**Programming in C++:** 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, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, calling functions with arrays, scope rules of functions and variables local and global variables. Introduction to Array and its advantages; One Dimensional Array: Declaration/initialization of One-dimensional array, inputting array elements, accessing array elements, manipulation of array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value) Declaration / Initialization of a String, string manipulations (counting vowels/ consonants/ digits/ special characters, case conversion, reversing a string, reversing each word of a string); Two-dimensional Array: Declaration/initialization of a two-dimensional array, inputting array elements accessing array elements, manipulation of array elements (sum of row element, column elements, diagonal elements, finding maximum / minimum values). Defining a Structure (Keyword Structure), declaring structure variables, accessing structure elements, passing structure to functions as value and reference argument/parameter, function returning structure array of structure, passing an array of structure as an argument/ a parameter to a function.	10

Text Books:

1. B. Gottfried, "***Schaum' sProgramming with C***," Tata McGraw-Hill.
2. J. Hubbard, "Schaum's *Outline of Programming with C++"* Tata McGraw-Hill.
3. E. Balaguruswamy, "***Programming in ANSI C,"*** Tata McGraw-Hill.
4. Y. Kanetkar, "***Let us C,"*** BPB Publications.
5. S. Lipschutz, "***Data Structures, Schaum's Outlines Series***," Tata McGraw-Hill.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, "***The C Programming Language***", Prentice Hall of India.
2. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, "***Fundamentals of Data Structures in C",*** W. H. Freeman and Company.
3. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, ***"Operating System Concepts, (6th Edition)"***.

ME-102: ENGINEERING DRAWING & GRAPHICS

TEACHING AND EXAMINATION SCHEME:

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

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction and Engineering Graphics:** Drawing instruments, freehand lettering (upper case & lowercase), types of lines, dimensioning, construction of conics, sections by eccentricity method, construction of cycloids, involutes, spirals, helix. Scales: Plain, Diagonal and Vernier. **Orthographic Projection of Lines and Planes:** Projections of points in different quadrants; Projections of straight lines inclined to one or both of the reference planes, true length and inclination of lines with reference planes, traces of lines. Projection of planes.	6
II	**Orthographic Projection of Solids**: Projections of simple solids in simple positions, axis inclined to one of the reference planes and axis inclined to both the reference planes-use change of position method OR auxiliary projection method. **Sections of Solids:** Sections of simple solids in simple vertical positions with section plane perpendicular/inclined to one of the reference planes – True shapes of sections. Sections and sectional views of right angular solids - Prism, Cylinder, Pyramid and Cone.	8
III	**Isometric Projections**: Isometric projections and views of simple and truncated simple solids, sphere, hemisphere and their combinations in simple position. Conversion of Pictorial views to Orthographic views by free hand sketching.	8

IV	**Development of Surfaces:** Development of surfaces of simple and cut regular solids - Prism, Pyramid, Cylinder and Cone. **Intersection of surfaces:** Intersection of prism in prism & cylinder in cylinder- axis bisecting at right angles only.	**6**

Text Books

1. ***"Engineering Drawing",*** by N.D. Bhatt.
2. ***"Engineering Graphics",*** by P.S. Gill.

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.

HS-102: ENVIRONMENTAL SCIENCE

TEACHING AND EXAMINATION SCHEME:

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

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Multidisciplinary nature of environmental studies, Scope and Importance; Natural Resources-Renewable and non-renewable resources; Forest resources - Use and over-exploitation, deforestation; Water resources - Use and over-utilization, floods, drought, conflicts over water; Mineral resources - Use and exploitation; Food resources - World food problem, effects of modern agriculture; Energy resources - Growing energy needs, renewable and non-renewable energy sources.	6
II	**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. **Biodiversity:** Introduction - Genetic, species and ecosystem diversity, Value of biodiversity -consumptive use, productive use, social, ethical and aesthetic values, Biodiversity at global, national and local levels; Threats to biodiversity - habitat loss, endangered and endemic species of India.	7
III	**Environmental Protection:** National concern for environment: Important environmental protection actsin India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.	6
IV	**Chemical Toxicology:** Toxic Elements in Water, Pesticides in Water, Impact of Toxic Chemicals on Enzymes. **Waste Management:** Waste water treatment (general)–primary, secondary and tertiary stages; Solid waste management: sources and effects of municipal waste, bio medical waste - process of waste management.	7

Text Books:

1. J Krishnawamy, R J Ranjit Daniels, ***"Environmental Studies",*** Wiley India.
2. Bernard J. Nebel, Richard T. Right, ***"Environmental Science",*** Prentice Hall.

References Books:

1. R K Khandal, ***"Environment and Ecology",*** Wiley India.
2. 8th edition ISV, Botkin and Keller, ***"Environmental Science",*** Wiley India.
3. Soli. J Arceivala, Shyam, R Asolekar, ***"Environmental Studies***", McGrawHill India, 2012.
4. D.L. Manjunath, ***"Environmental Studies",*** Pearson Education India.

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CH-101: ENGINEERING 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 Treatment:** Introduction, Sources of water, Common Impurities in water, Hardness of water & its determination by EDTA method, Alkalinity of water, BOD & COD; Hardness of water, Disadvantages of hard water, sludge and scale formation in boilers and its prevention, Techniques of water softening (Zeolite process and ion exchange process). Principles and processes used in domestic water purifiers. **Electrochemistry:** Introduction to electrochemistry, Electrodes–reference electrodes, Glass electrode (pH determination), Nernst equation–derivation and applications; Storage devices–lead-acid, Ni-Cd, Li-ion batteries, Hydrogen-oxygen Fuel Cell and Solar Cell.	9
II	**Corrosion:** Introduction, types of corrosion (dry and wet corrosion), theory of corrosion, types of electrochemical corrosion (galvanic, pitting, differential aeration and stress corrosion), Factors influencing corrosion and Prevention of corrosion. **Spectroscopy:** UV-Vis: Principle, instrumentation, Lambert-Beer's Law, electronic transitions, auxochrome, chromophore, effect of conjugation and solvent 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 IR frequency, applications. **XRD:** Basic principle and applications.	9

III	**Fuels and Combustion:** Introduction, classification of fuels (Solid, Liquid and Gases), Analysis of Coal(Proximate and Ultimate), Petroleum fuels, Cracking, Reforming, Octane no, Cetane no, Gaseous fuel – Water gas, producer gas. **Lubricants:** Principle of Lubrication, Mechanism of Lubrication**,** Types and selection of lubricants, Properties of Lubricants.	**8**
IV	**Polymers:** Introduction, Types of polymers, Thermoplastic and Thermosetting resins (Synthesis and applications of Bakelite, epoxy resin, Urea formaldehyde, teflon, PMMA, PVC, Polyurethane), Natural and synthetic rubbers, Fibres, Conducting & biodegradable polymers and their applications. **Nano Materials:** Introduction, Prepration, Properties of nanomaterials, Graphene, Graphite, Fullerenes, Carbonnano-tubes, nano-wires, nano-cones, Application of nano-materials.	**9**

Text Books:

1. ***"Engineering Chemistry"***, Wiley India
2. ***"Physical Chemistry",*** Gordon M. Barrow; McGraw Hill

References Books:

1. Shashi Chawala, ***"A Text Book of Engineering Chemistry"***, Dhanpat Rai & Co.
2. Peter Atkin, ***"Physical Chemistry***", W.H. Freeeman Publishers.

EE -101: PRINCIPLES OF ELECTRICAL ENGG.

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	**Introduction:** Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables, Steam, Hydel, and Nuclear power generation. **D C Circuits and Network Theorems:** Circuit Concepts - Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements - R, L and C as linear elements, Source transformation Kirchhoff's laws; Loop and nodal methods of analysis; Delta-star and star-delta conversion; Network theorems - Superposition theorem, Thevenin's theorem, Norton's theorem and Maximum Power Transfer theorem.	8
II	**Single Phase AC Circuits:** Single phase EMF generation, average and effective values of sinusoids, joperations, complex representation of impedances, phasor diagrams, power factor, power in complex notation, solution of series and parallel circuits. Introduction to resonance in series RLC circuit, Numerical problems; Introduction to domesting wiring. **Three Phase AC Circuits**: Three-phase systems: Star and delta connections, three-phase three wire and three-phase four-wire systems, analysis of balanced and unbalanced star and delta connected loads, power in three-phase balanced circuits. Numerical problems.	8
III	**Measuring Instruments:** Types of instruments, Construction and working principles of PMMC and Moving Iron type voltmeters & ammeters, Use of shunts and multipliers; dynamometer, wattmeter, AC watt hour meter.	8

	Magnetic circuits: Ampere's circuital law, B –H curve, Hysteresis, Permeability and Reluctance, Solution of magnetic circuits, Hysteresis and eddy current losses.	
IV	**Single Phase Transformer**: Transformers: Construction and operation of single phase transformer, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, single phase auto-transformers. **Electric Machines:** Working principle, Construction and applications of DC machines and AC machines, Single phase induction motors - split phase, capacitor start and capacitor start & run motors; EMF and Torque equations, Characteristics of DC generators and motors, Speed control of DC motors and DC motor starters.	**8**

Text Books:

1. E. Hughes, *"***Electrical Technology***"*, Pearson Education, 2010.
2. I. J. Nagrath and D. P. Kothari, '**Basic Electrical Engineering'** TATA McGraw Hill Education, 2009.

References Books:

1. V. Del Toro, *"***Electrical Engg Fundamentals***"*, PHI Learning, 2009.
2. B. Dwivedi & A. Tripathi "**Fundamentals of Electrical Engineering**", Wiley India.
3. D. A. Bell, **"Electric Circuits***"*, 7th Ed., Oxford Higher Education, 2009.

EC -101: FUNDAMENTALS OF ELECTRONICS ENGG.

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	**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 dioade and V-I Charactristics; Rectifiers - half-wave, full-wave and bridge rectifiers; Filters - L, C, LC and π filters; Zener diode, V-I Characrristics and Zener diode as voltage regulator.	8
I	**Bipolar Junction Transistors (BJT):** Transistor operation and current components in p-n-p and n-p-ntransistors, input/output characteristics of CB and CE configurations, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits; Transistor as an Amplifier; Numerical problems as applicable. **Field Effect Transistors (FET):** Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. **MOSFET:** Depletion and enhancement type MOSFET- Construction, operation and characteristics.	8
III	**Oscillators:** Introduction, Criteria for oscillation, types of oscillators -	8

	Hartley, Calpitt, RC Phase shift and Wein bridge oscillators. **Operational Amplifiers:** Concept of ideal operational amplifiers, ideal operational amplifier sparameters, inverting, non-inverting and unity gain amplifiers, adders and difference amplifiers.	
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**

Text Books:

1. ***"Electronic Devices and Circuits",*** D. A. Bell - 5th Edition (Oxford).
2. ***"Electronics –Fundamentals & Applications",*** D. Chattopadhyay and P. C. Rakshit - 11th Edition (New Age International)
3. ***"Electronic Devices & Circuits",***R. L. Boylestad & L. Mashelsky – 10th Edition (Pearson)
4. ***"Digital Principles and Applications",*** A. Malvino and Leach - 7th Edition (TMH)

References Books:

1. A. Malvino & D. J. Bates ***"Electronic Principles",*** - 7th Edition (TMH)
2. J. Millman, Halkias & Parikh, ***"Integrated Electronics",*** - 2nd Edition (TMH)

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ME-103: WORKSHOP TECHNOLOGY

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	3	3	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.	3
II	Introduction to Metal Forming Processes, and Tools, Hot-working versus cold-working, Introduction to Rolling, Wire & Tube-drawing/making and Extrusion, and their uses; Press-work, Die & Punch assembly, applications of forming.	3
III	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.	3
IV	Non-Metallic Materials: Common types, Carpentry tools & uses of Wood, common types of Joints in wood.	3
V	Machining, Machinining Tools, Basic principles of Lathe and operations performed on it. Basic description of Shape, Planer, Drilling, Milling & Grinding.	3
VI	Introduction to Welding, classification of welding processes, Welding Tools, Introduction to Electric-Arc welding, Resistance welding, Gas-welding, types of flames and their applications, Soldering & Brazing processes and their uses.	3
VII	Fitting tools, fitting operations, sawing, filing, chipping, thread cutting (with taps and dies), marking and marking tools.	3

	Introduction to Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Comparison of NC and CNC.	

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.

Suggested list of jobs, a student is required to make in the workshop - at least one job in each shop:

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:**
	Study of tools & operations and carpentry joints. Prepare half-lap corner joint, mortise & tennon joints Simple exercise on wood working lathe
3.	**Fitting Shop:**
	Study of tools & operations Simple exercises involving fitting work -drilling, tapping or dieing
4.	**Black Smithy Shop:**
	Study of tools, operations, hot and cold working, Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

5.	**Welding Shop:**
	Study of equipments of Arc Welding and Gas welding (MIG/TIG) Preparation of Simple butt and Lap welded joints. Oxy-acetylene flame cutting and related job preparation
6.	**Sheet-metal Shop:**
	Introduction to Tools, Metals used in sheet metal work viz. Galvanised iron, Aluminium sheet, etc. Fabrication of Funnel, tool-box, tray, electric panel box etc.
7.	**Machine Shop:**
	Study of Lathe, Drilling, Shaper, Planer and Milling Machines and commonly done operations on these machines Making a job on lathe involving plane turning, step turning, taper turning and threading operations
8.	**Foundry Shop:**
	Study of tools & operations, and pattern allowances to prepare a Mould with the use of a core and cast it.

HS-103: DISASTER MANAGEMENT

TEACHING AND EXAMINATION SCHEME:

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

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical, Terrorism, Extra Terrestrial and other natural calamities. Hazards, Risks and Vulnerabilities. Assessment of Disaster Vulnerability of a location and vulnerable groups, National policy on disaster Management.	6
II	Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief & Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools, Voluntary Agencies & Community Participation at various stages of disaster, management, Integration of Rural Development Programmes with disaster reduction and mitigation activities.	7
III	Renewable and non-renewable resources, 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. Causes, effects and control measures of Air pollution, Water pollution, Noise pollution and Nuclear hazards.	7
IV	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 Energy Use: Past, present and future, Role of Engineers.	6

Text Books:

1. G. K. Ghosh, ***"Disaster Management",*** A. P. H. Publishing Corporation.
2. R Rajgopalan, ***"Environmental Studies"***, Oxford University Press

Reference Books:

1. B Narayan, ***"Disaster Management",*** A. P. H. Publishing Corporation.
2. Basak, ***"Environmental Studies"***, Pearson Publication.

HS-204: BUISNESS COMMUNICATIONS

TEACHING AND EXAMINATION SCHEME:

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

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to Business Communication:** Importance of communication in business, process models of communication, and Types of information- order, advise, suggestion, motivation, persuation, warning and education.	6
II	**Business Communication:** Letters, Cover Letter, Differences between bio-data, CV and Resume, Letter for Job Application, Thank You Letter, Letter of Complaint, Memos, Memorandum drafting; E. Communication: Email and Social Media. **Oral Communication:** Types of oral communication, Barriers to oral communication, Mass Communication – Nature & Scope of Mass Communication, function of mass communication – Media of mass communication.	7
III	**Business Report Writing:** Report Writing: Types, Structure of a report, Methods and Models of Report Writing, Technical Proposal - Concept, Layout, and Examples of Technical Proposals. **Types of reports:** Progress and Annual reports–format and Analysis of sample reports from industry–Synopsis and thesis writing.	6
IV	**Spoken and Presentation Skills:** Impromptu speech–tackling hesitation, shyness and nervousness inspeaking –Public speaking; Academic and professional presentations – Group discussions, Planning, preparing and delivering a presentation, essentials of presentation - etiquette, clarity, lively delivery – speech rhythm, speech initiators body language – voice, posture & gesture, eye contact, dress codes; Interviewing, Nagociating a job offer.	7

Text Books:

1. ***"Essentials of Business Communication",*** by R. Pal and JS Korlahhi, Sultan Chand & amp; Sons, New Delhi.
2. ***"Basic Communication Skills for Technology",*** by Andre J. Rutherford, Pearson Education Asia, patparganj, New Delhi 92.

Reference Books:

1. ***"Business Communication",*** by Meenakshi Raman and Prakash Singh (Oxford)
2. ***"Advanced Communication Skills"***, V. Prasad, Atma Ram Publications, New Delhi.

MA–202: ENGINEERING 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	Contents	No. of hours
I	**Ordinary Differential Equations:** Brief review of first order ordinary differential equations, Exact differential equations, Equations reducible to exact equations; Solution of differential equations – variable separable. **Linear Differential Equations of first order and Higher degree:** Equations of the first order and higher degree, Linear differential equations with constant coefficients (nth order): general solution, complementary function and particular integral; Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations), Applications of differential equations to engineering problems.	6
II	**Series Solution of Differential Equations:** Series solution of second order differential equations with variable coefficient (Power series method and Frobeneous method). **Special Functions:** Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.	7
III	**Laplace Transforms:** Laplace **t**ransforms of simple functions, Basic operational properties, Transforms of derivatives and integrals, Initial and final value theorems; Inverse Laplace transforms – Convolution theorem; Periodic functions - Unit step function, Laplace transform of Periodic function; Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.	6
IV	**Fourier Series:** Periodic Functions, Fourier Series of period 2π, Change of interval, Even and Odd periodic functions, Expansion of odd and even periodic functions, Half range Sine and Cosine Series, Typical wave-forms,	7

	Parseval's formula. **Partial Differential Equations:** Harmonic analysis, Partial Differential Equations with constant coefficients, Complimentary function and particular integral.	

Text Books:

1 *B.S. Grewal, **"Higher Engineering Mathematics"***, Khanna Publishers.

2. 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

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HS–111: COMMUNICATION LAB

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

NOTE: Practice sessions as per the topics in the syllabus for the course "**ENGLISH COMMUNICATION"** will be conducted in the laboratory class. Following is the suggested list of excercises that must be performed during the semester:

I	**Phonetic transcription:** Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.	
	(a)	transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;
	(b)	transcription of words presented orally;
	(c)	conversion of words presented through IPA symbols into normal orthography;
	(d)	syllable division and stress marking (in words presented in IPA form).
2.	**Listening:** listening with a focus on pronunciation (ear-training), segmental sounds, stress, weak forms, intonation; the students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.	
3.	**Speaking:** pronunciation practice (for accent neutralization), particularly of problem sounds, in isolated words as well as sentences, practising word stress, rhythm in sentences, weak forms, intonation; reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation;	
4.	**Grammar and usage:** The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.	

5.	**Project Work:** Students will be required to produce and submit by the end of Semester a 350-500word project report on a topic of their choice. The project should involve data collection, analysis and reporting.

Recommended books:

1. Grant Taylor ***"English Conversation Practice".***
2. R. C. Sharma & Krishna Mohan***"Business correspondence and Report Writing***".
3. Chrissie Wright (Ed.) "***Handbook of Practical Communication Skill",*** JAICO Books.
4. Veena Kumar, "***The Sounds of English, Makaav Educational Software"***, New Delhi.

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PH -111: ENGINEERING PHYSICS LAB

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

Note:- Practicals as per the topics in the syllabus for the course will be conducted in the laboratory class. Following is the suggested list of exercises out of which a minimum of 8-10 experiments must be performed by a student during the semester:

List of Experiments:	
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.

CS – 111: COMPUTER PROGRAMMING LAB

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

Note:- Practicals as per the topics in the syllabus for the course will be conducted in the lab class. Following is the suggested list of suggestive exercises to be performed by a student during the semester:

Write following programs in C++:	
1.	Using basic statements like control statements, looping statements, various I/O statements and various data structures.
2.	Creating classes in C++ for understanding of basic OOPS features.
3.	Representing concepts of data hiding, function overloading and operator overloading.
4.	Using memory management features and various constructors and destructors.
5.	Representing Inheritance, virtual classes and polymorphism.
6.	Writing generic functions.
7.	File handling programs.
8.	Design and Implementation of some real life problems using Object Oriented techniques (Object Model/Dynamic Model/Functional Model)

EE–111: ELECTRICAL ENGG. LAB

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

NOTE:- Experiments as per the topics in the syllabus for the course `**Principles of Electrical Engg** will be conducted in the laboratory class. Following is the suggested list of experiments out of which 7-8 experiments must be performed during the semester:

List of Experiments:		
1.	Verification of Kirchhoff's law	
2.	Verification of Norton's theorem	
3.	Verification of Thevenin's theorem	
4.	Verification of Series R-L-C circuit	
5.	Verification of Parallel R-L-C circuit	
6.	Measurement of Power and Power factor of three phase inductive load by two wattmeter method.	
7.	To draw the magnetization characteristics of separately excited dc motor.	
8.	To perform the external load characteristics of dc shunt motor.	
9.	To perform O.C. and S.C. test of a single phase transformer	
10.	Wiring Exercises:	
	(a)	Study of various wiring components (wires, switches, fuse, sockets, plugs, lamp holders, lamps etc. their uses and ratings).

	(b)	Control of two lamps from two switches (looping system).
	(c)	Staircase wiring.
	Step down transformer winding of less than 5VA.	

CH – 111: ENGINEERNG CHEMISTRY LAB

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

NOTE:- Practicals as per the topics in the syllabus for the course will be conducted in the laboratory class. Following is the suggested list of excercises out of which a minmum of 8/10 experiments must be performed by a student during the semester:

List of Experiments:	
1.	To determine surface tension of given liquid by drop number method using stalgmometer.
2.	To determine % age of moisture, volatile matter, ash and fixed carbon in given sample of coal by proximate analysis method.
3.	To determine total alkalinity in a given sample of water using standard acid.
4.	To determine the percentage of Chlorine in sample of CaOCl2 dissolved in one litre of solution.
5.	To determine total hardness of water using complexometric titration method.
6.	To determine the surface tension of the two given unknown liquids by using Stalgmometer and identify the given liquid.
7.	To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer and identify the given liquid.
8.	To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer.
9.	To determine total acid number value(total acid number TAN) of an oil sample.
10.	To determine the flash point and fire point of given sample of oil using Pens key Marten's

	apparatus.
11.	To determine the amount of Chlorine in given sample of water using N/20 sodium Thiosulphate solution.
12.	To determine the Beer's Law and apply it to find the concentration of given unknown solution by spectra-photometer.

EC-111: ELECTRONICS ENGG. LAB

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

Experiments as per the topics in the syllabus for the course '**Fundamentals of Electronics Engg'** will be conducted in the laboratory class. Following is the suggested list of experiments out of which 7-8 experiments must be performed during the semester:

List of Experiments:		
1.	Familiarization with electronic components (Active & Passive).	
2.	Familiarization with electronic equipments (multimeters, CROs, power sypply and function generators).	
3.	(a)	Study of the characteristics of P-N junction diode.
	(b)	Study of the characteristics of Zener diode
4.	(a)	Construction of half-wave rectifier and full wave rectifier circuits & study of their output waveforms by CRO and calculation of efficiency and ripple factor.
	(b)	Construction of an unregulated DC power supply (using transformer, fullwave rectifier and capacitor filter) and study of its output waveform by CRO.
5.	Study of frequency response of any one oscillator.	
6.	Study of output characteristics of a Common Emitter Transistor.	
7.	Study of inverting and non inverting amplifiers using Op-Amp.	

8.	Study of unity gain amplifier and Adder circuit using Op-Amp and observe their outputs using CRO.
9.	Study of truth tables of different logic gates (AND, OR, NAND, NOR, XOR, XNOR).