SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTME404	DCS	MACHINE DESIGN - I	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) To understand the design methodology for machine elements.
(B) To analyse the forces acting on a machine element.
(C) Apply suitable design methodology.
(D) To understand the various standards and methods of standardization.
(E) To apply the concept of parametric design and validation by strength analysis.

Course Outcomes (COs):

Student will be able to

1. Understand the design concepts of various machine elements.
2. Design the various types of springs.
3. Design the shafts and couplings.
4. Design the threaded and welded joints.
5. Understand the concepts of bearing lubrication and design the journal bearings.

Syllabus

Unit -I

Introduction: Introduction to Design process, Design considerations, engineering materials properties and processes of their selection, BIS designation of steels, manufacturing considerations in design, Bending and Torsional stress equations, Impact and Shock loading, Stress concentration factor, Size factor, Surface limits factor, Design stress.

Unit -II

Fatigue strength and design of springs: Variable and cyclic loads, Fatigue Strength, Endurance limit, S- N Curve, Soderberg, Gerber and Goodman equations, fatigue failure, design consideration in fatigue, classification and spring materials, Spring end formation, Design of helical compression springs, helical extension springs, torsion springs, laminated springs, Protective coatings, Equalized stress in spring leaves. Multi - leaf springs. Surge in springs, nipping and shot peening.

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Unit -III

Shafts, keys and couplings: Shafts design on strength basis, torsional rigidity basis, ASME codes for shafts, Keys and cotter design, Flat and square keys, Splines, Rigid and flange couplings, Flexible couplings.

Unit -IV

Threaded and welded joints: Forms of threads, basic types of screw fastenings, ISO metric screw threads, eccentrically loaded bolted joints, Torque requirement for bolt tightening, Fluctuations loads on bolted joints, fasteners, Joints with combined stresses. Power screws, Force analysis. Collar friction, Differential and compound screws design. Types and strength of weld joints subjected to bending and fluctuating loads, cotter and knuckle joints, welded joints, different types welded joints and their design aspects.

Unit - V

Journal Bearing: Types of lubrication, viscosity, hydrodynamic theory, design factors, temperature and viscosity considerations, Reynold's equation, stable and unstable operation, heat dissipation and thermal equilibrium, boundary lubrication, dimensionless numbers, Design of journal bearings, Rolling-element Bearings: Types of rolling contact bearing, bearing friction and power loss, bearing life; Radial, thrust & axial loads; Static & dynamic load capacities; Selection of ball and roller bearings; lubrication and sealing.

Reference Books:

1. *"Design of Machine elements", by Bhandari, V.B. (2010) Tata Mc Graw Hill Book Co, Third Edition.*
2. *"Machine Design", by R.S. Khurmi, J. K. Gupta. (2008) Eurasia Publishing House (Pvt.) Ltd.Revised Edition.*
3. *"Machine Design" by Shingley J.E, TMH.*
4. *"Design of Machine elements" by Sharma and Purohit; PHI.*
5. *"Machine Design" by Wentzell Timothy H, Cengage learning.*
6. *"Machine Design" by Mubeen; Khanna Publisher.*
7. *"Design of Machine Elements" by Ganesh Babu K and Srithar k, TMH.*
8. *"Machine Design" by Sharma & Agrawal; Kataria & sons.*

List of Experiments (Please Expand it):

Solve various design problems as per the syllabus.

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 307		ELECTRICAL INSTRUMENTATION	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To enable the students to learn in detail about the various instruments available for monitoring/measuring electrical parameters encountered in domestic / industrial applications.
2. To introduce the fundamental concepts of electrical instrumentation.

Course Outcomes:

1. To test and calibrate ammeter, voltmeter, and Wattmeter and energy meter .
2. Learn the measurement of magnetic parameters.
3. Understand the operating principles of Energy and power meters.
4. Measure low, medium & high Resistances using suitable bridges.
5. To select proper instrument for measurement various Electrical elements

Syllabus:

UNIT I

Measurement and error, Accuracy and precision, sensitivity resolution, Error & Error analysis, Effect of temperature, Internal friction, Stray field, Hysteresis and Frequency variation & method of minimizing them, Loading effects, due to shunt connected and series connected instruments, calibration curve, Testing & calibration of instruments. Galvanometers –Theory & operation of ballistic galvanometer, D'arsonal galvanometer, galvanometer motion & damping, Sensitivity, Flux meter, Vibration galvanometer, Spot deflection galvanometer. Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling.

UNIT II

Different types of Ammeter & Voltmeter –PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier, Ferro dynamic & Electro-thermic, Expression for control & deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier.

UNIT III

Instrument transformers: Potential and current transformers, ratio and phase angle errors, testing of instrument transformers, Difference between CT and PT, errors and reduction of errors. Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element

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and three element dynamometer wattmeter, Measurement of power in three phase circuit, one, two & three wattmeter method, Measurement of reactive power by single wattmeter, Measurement of power using CTs & PTs.

UNIT IV

Measurement of Energy: Single phase induction type energy meter –construction & operation – driving and braking torques –errors & compensations –Testing by phantom loading and using R.S.S. meter-Three phase energy meter –Tri-vector meter –Maximum demand meter, Ampere hour meter. Potentiometer –DC potentiometer standardization –Lab type Crompton's potentiometer, application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

UNIT V

Miscellaneous Instruments & Measurements: Power factor meter, Single phase and three phase Electro-dynamometer type & moving iron type. Frequency meter –Vibrating reed, Resonance type & Weston type, Synchronoscope, Ohmmeter –series & stunt type, Multi-meter, Megger & Ratio meter. Resistance Measurement –Classification of low, medium & high resistance – Voltmeter, Ammeter, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Earth resistance measurement. Magnetic Measurement –B-H Curve, Hysteresis Loop determination.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney, Dhanpat Rai & Co.

Reference Books:

1. Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1988.
2. Jones, B.E., "Instrumentation Measurement and Feedback", Tata McGraw-Hill, 1986.
3. Golding, E.W., "Electrical Measurement and Measuring Instruments", 3rd Edition, Sir Issac Pitman and Sons, 1960.

List of Practicals:

1. Measurement of low resistance using Kelvin's Double bridge
2. Measurement of medium resistance using Whetstone's bridge
3. Measurement of high resistance by loss of charge method
4. Measurement of Insulation resistance using Megger
5. Measurement of earth resistance by fall of potential method and verification by using earth tester
6. Measurement of power in a single phase ac circuit by three voltmeter/ three Ammeter method
7. Calibration of a dynamometer type of wattmeter with respect to a standard/Sub Standard wattmeter
8. Calibration of single phase digital/ Electronic type energy meter.
9. Calibration of a dynamometer type of wattmeter by Phantom Loading method.
10. Measurements using Instrument Transformers.
11. Study of various types of Indicating Instruments.
12. Measurement of Power in three phase circuit by one, two & three wattmeters.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 301		CIRCUIT THEORY	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To introduce the students with the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction. To solve the electrical network using mesh and nodal analysis by applying network theorems, analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.

Course Outcomes:

Upon completion of this course students will be able to:

1. Apply the nodal and mesh methods of circuit analysis.
2. Apply linearity and superposition concepts to analyze RL, RC, and RLC circuits in time and frequency domains.
3. Express complex circuits in their simpler Thévenin and Norton equivalent forms.
4. Analyze circuits both in time and frequency domains.
5. Construct and make time and frequency domain measurements on elementary RL, RC, and RLC circuits.

Syllabus:

UNIT I

Practical Voltage & current sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh. Analysis of magnetically coupled circuits, Dot convention, coupling coefficient, tuned circuits, Series and parallel resonance, frequency-response of series and Parallel circuits, Q –factor, Bandwidth.
Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks.

UNIT II

Transient analysis- Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. Steady state analysis- Concept of phasor & vector, impedance & admittance,

UNIT III

Network Theorems for AC & DC circuits-Thevenins & Norton's, Superpositions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's

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theorem, problems with dependent & independent sources.

UNIT IV

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

UNIT V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, terminated two port networks.

Text Books:

1. A K Chakrabarti :Circuit theory: Dhanpat Rai

Reference Books:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH

List of Practicals:

1. Verification of Thevenin Theorem.
2. Verification of Superposition Theorem.
3. Verification of Reciprocity Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Verification of Millman's Theorem.
6. Determination of Open Circuit parameters of a Two Port Network.
7. Determination of Short Circuit parameters of a Two Port Network.
8. Determination of A,B, C, D parameters of a Two Port Network
9. Determination of Frequency Response of RLC Series Circuit.
10. Determination of Frequency Response of RLC parallel Circuit.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
BTME303	DCS	STRENGTH OF MATERIALS	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P Practical; C - Credit
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A)To gain knowledge of different types of stresses, strain and deformation induced in the mechanical components due to external loads. (B)To study the distribution of various stresses in the mechanical elements such as beams, shafts etc. (C) To study effect of various loading conditions of column and gain knowledge of theories of failure.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Define and memorize mechanical properties of material & select appropriate material for a given working Conditions.
2. Explain simple stresses, bending stress, shear stress, torsion stress, principle stresses, thin and thick cylinder, shaft, springs, columns and theories of failures.
3. Calculate and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
4. Design of shaft and pressure vessels.
5. Justify bending equation and torsion equation and use it to solve the numerical.

Syllabus

Unit- 1

Introduction: Stress-Strain, uni-axial, bi-axial and tri-axial stresses, tensile & compressive stresses, shear stress, Stress Strain Diagram, Poisson's Ratio, Modulus of elasticity, Modulus of rigidity, Bulk modulus, Factor of safety.

Unit- II

Simple & Compound Stresses: Definition, Deformation due to self-weight, bars of varying

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B. Tech/B.Tech+MBA in Mechanical Engineering

Year 2nd **Sem 3rd**

sections, composite sections, principle of superposition, strain energy, Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analyses, Thermal Stress.

Unit–III

Bending and Deflection: Symmetric member, Deflection of beams, deformation and stress, bending of composite sections, Macaulay's method and Area moment method for deflection of beams.

Unit–IV

Torsion: Torsion of circular shafts-solid and hollow, Strength of Shaft and composite shaft, combined bending and torsion, strain energy due to torsion.

Unit–V

Columns and Theories of Failure: Buckling load, types of end conditions for column, Euler's column theory and its limitations, Rankine- Gordon Formula, Theories of failures: Maximum principal stress theory, Maximum principal strain theory, maximum shear stress theory; maximum strain energy theory, maximum shear strain energy theory; Application of theories to different materials and loading conditions.

Reference Books:

1. *Strenght of Materials, Dr. R.K. Bansal, Lakshmi Publications, New Delhi.*
2. *Strength of Materials, Basavarajaiah and Mahadevappa, Khanna Publishers, New Delhi.*
3. *Mechanics of Materials, James M. Gere (5th Edition), Thomson Learning*
4. *Strength of Materials—S. Ramamruthum, Dhanpat Rai Pvt. Ltd.*
5. *Mechanics of Materials—S. S. Ratton, TMH Pvt. Ltd.*
6. *Strength of Materials, Subramanyam, Oxford University Press, Edition 2005*
7. *Elements of Strength of Materials, Timoshenko and Young Affiliated East-West Press*
8. *Strength of Materials, Singer Harper and Row Publications*
9. *Mechanics of Structures—S. B. Junnarkar, Charotar Publication.*
10. *Mechanics of Materials, B.C Punmia Ashok Jain, Arun Jain, Lakshmi Publications, New Delhi.*
11. *Strength of Materials—W. Nash, Schaum's Outline Series, McGraw Hill Publication.*
12. *Strength of Materials, S.S. Bhavikatti, Vikas Publishing House Pvt Limited.*

List of Experiments

1. Perform Brinell and Rockwell Hardness tests to find BHN and RHN for given specification.
2. Perform Izod/ Charpy impact test.
3. Perform Fatigue test.
4. Perform Torsion test.
5. To find tensile strength of given specimen by tensile test on MS and CI using UTM.
6. Perform Direct/cross Shear test on MS and CI by UTM.

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
ML301	COMPULSORY	ENVIRONMENT AND ENERGY STUDIES	3	0	0	3	60	20	20	0	0

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The students will be able to:

1. To understand sources of information required for addressing environmental challenges.
2. To identify a suite of contemporary tools and techniques in environmental informatics.
3. To apply literacy, numeracy and critical thinking skills to environmental problem-solving.

Course Outcomes:

The students should be able to:

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Syllabus:

UNIT I

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

UNIT II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resouces, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.

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UNIT III

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

UNIT IV

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, manwildlife conflicts; Conservation of biodiversity: In-situ and Exsitu conservation. National biodiversity act.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP).

Reference Books:

1. Agarwal, K.C.,(latest edition).Environmental Biology, Bikaner :Nidi Pub. Ltd.,
2. Brunner R.C.(latest edition) Hazardous Waste Incineration, McGraw Hill Inc.
3. Clank R.S. .,(latest edition. Marine Pollution, Clanderson Press Oxford (TB).
4. Environmental Encyclopedia, Jaico Pub. Mumbai,
5. De A.K(latest edition) Environmental Chemistry, Wiley Wastern Ltd.
6. ErachBharucha(2005).Environmental Studies for Undergraduate Courses by for University Grants Commission.
7. R. Rajagopalan(2006).Environmental Studies. Oxford University Press.
8. M. AnjiReddy(2006).Textbook of Environmental Sciences and Technology. BS Publication.
9. Richard T. Wright(2008).Enviromental Science: towards a sustainable future PHL Learning Private Ltd. New Delhi.
10. Gilbert M. Masters and Wendell P. Ela .(2008).Environmental Engineering and science. PHI Learning Pvt Ltd.
11. Daniel B. Botkin& Edwards A. Keller(2008).Environmental Science Wiley INDIA edition.
12. AnubhaKaushik(2009).Enviromental Studies. New age international publishers.

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE 404		SURVEYING	2	1	2	4	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To understand the principles of land and hydrographic surveying
2. To know the application of surveying in civil engineering projects

Course Outcomes:

Students at the end of the course will be able to

1. Choose modern survey equipments to measure angles and distances
2. Extend the knowledge to other civil engineering field
3. Analyze and solve the problems related to survey

Syllabus:

UNIT I

Traversing: Theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements.

UNIT II

Trigonometric leveling: Introduction, methods of observations – direct and reciprocal, calculation of elevation of different structure using trigonometric leveling, single plane method , double plane method.

UNIT III

Tachometry: Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

UNIT IV

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out.

UNIT V

Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying, aerial photography, tilt and height distortions, Remote sensing, simple equipments, elements of image interpretation, image-processing systems.

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Text Books:

1. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
2. T.P. Kanetkar, Surveying & Levelling, Vol. I & II3. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH

Reference Books:

1. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
2. David Clark &Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London..
3. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

List of Practical's:

1. Determination of elevation of various points with Dumpy Level by collimation plane method & rise and fall method.
2. Fixing bench mark with respect to temporary bench mark with Dumpy level by fly levelling & check levelling.
3. L section & Cross section of the road (one full size drawing sheet each for L-section & cross section).
4. Measurement of horizontal angles with the help of theodolites by method of repetition.
5. Measurement of vertical angles with theodolite.
6. Determination of horizontal distance between two inaccessible points with theodolite.
7. Locating given building by theodolite traversing (One full size drawing sheet).
8. Locating given building by plane table surveying (One full size drawing sheet).
9. Three point problem in plane table surveying.
10. Determination of elevation of point by trigonometric leveling.

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