

SCHEME OF EXAMINATION

And

SYLLABI

For

BACHELOR OF VOCATION

In

(CONSTRUCTION TECHNOLOGY)

**BRIDGE COURSE
LEVEL IV SKILL COMPONENT**

And

1st SEMESTER to 2nd SEMESTER

Offered by

University School of Engineering and Technology



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

**Guru Gobind Singh Indraprastha University
Sector 16-C, Dwarka, Delhi – 110078 [INDIA]**

www.ipu.ac.in

NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF B.VOC

1. **ET** stands for Engineering and Technology.
2. **V** stands for Vocation.
3. **MC** stands for Mobile Communication.
4. **SD** stands for Software Development.
5. **AE** stands for Automobile.
6. **CE** stands for Consumer Electronics.
7. **PT** stands for Printing Technology.
8. **CT** stands for Construction Technology.
9. **RA** stands for Refrigeration & Air-Conditioning.
10. **PD** stands for Power Distribution Management.
11. **ID** stands for Interior Design.
12. **AA** stands for Applied Arts.
13. **CS** stands for Computer Science.
14. **MS** stands for Management Studies.
15. **EN** stands for Environmental Engineering
16. **AS** stands for Applied Science.
17. **HS** stands for Humanities and Social Sciences.
18. **SS** stands for Social Services.
19. **L/T** stands for Lecture and Tutorial
20. **P** stands for Practicals.
21. **S/D** stands for Drawing/Studio
22. **P/D** stands for Practical/Drawing

TITLE OF THE PROGRAMME
BACHELOR OF VOCATION IN CONSTRUCTION TECHNOLOGY

Preamble

Construction activity is an integral part of nation's infrastructure and industrial development. Construction industry is vital in socio-economic development and also generates substantial employment and provides a growth impetus to other sectors through backward and forward linkages. Construction Technology deals with design, construction and maintenance of hospitals, schools, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewerage, drainage); highways, roads, ports, railways, airports; power systems; irrigation and agriculture systems; telecommunications; dams, bridges, tunnels and other structures. Requirement of skilled personnel/ technicians in construction engineering works is growing day to day. Construction industries, public & private entrepreneurs, government organizations, builders, Real Estate owners are in need of technicians in this area. Hence this course has several advantages that will enable student to get engaged in any civil engineering work area.

Objectives of course

The B. Voc in Construction Technology aims at providing the expertise needed to effectively lead a construction project and work with industry. It aims at providing over all technical proficiency, the industrial working exposure, and the entrepreneurial skills for success in this ever-evolving industry.

The curriculum teaches you how to integrate multiple professional requirements for bringing construction projects to successful completion, including building construction, planning and drafting, estimating, cost control, new technologies, methods of surveying & advanced surveying, concrete technology, geo-technology, structural design, CAD, water management & sanitation, transportation engineering, project planning, scheduling & negotiation, and labour management etc. The coursework aims at managing various types of contractual relationships governing the owner, the contractor, subcontractors, consultants, and architects, as well as the essential skills of bidding, negotiating, handling disputes and claims. To train the students to gear up to employment opportunities in construction industry in Private & Public sectors, state and central public works departments and other Government undertakings, Self-employment ventures/ Civil Engineering Contractor etc.

Program Structure

The course titled as B.Voc. (Construction Technology) is proposed with Bridge course and modular structure that gives exit option after every year with employable skill at the end of each module. The three modules are as under:

Award	Duration	Total number of credits	Remarks
Diploma	1 year	60	2 SEMESTERS
Advanced Diploma	2 years	120	4 SEMESTERS
B. Voc. Degree	3 years	180	6 SEMESTERS

All students should undergo bridge course program of 180 hrs duration (12 credits) in each semester for first two semesters along with **level-5 regular course** (i.e. first year of B.Voc). The credits (Total 12+12= 24) earned are of qualifying nature and should be completed within four semesters (2 years) for obtaining Scheme and Syllabi for B. Voc. (Construction Technology), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

Diploma/Advanced Diploma/ B.Voc Degree, as a pre-requisite. Bridge course to be taught during first year and evaluation for bridge course modules will be of Non University Examination System (NUES) pattern.

Program Outcomes

1. Diploma in Construction Technology

Outcome: Student shall have acquired adequate skills to assist and work as surveyor, drafts man, supervisor and site engineer. After successful completion of this module and some additional practice the student should have attained

- Skill in preparing, reading and interpreting drawing pertaining to Civil engineering and allied works
- Understanding the use of various types of construction materials, their characteristics and suitability in construction sector
- Ability to perform surveying works for various construction works & exposure to various digital equipment
- Competencies in estimating and costing and contracting of civil works including measurement and billing
- Knowledge of appropriate attitude and values and awareness regarding ecology and environment engineering
- Skill in using computers in the field of civil engineering

2. Advanced Diploma in Construction Technology

Outcome: Student shall have acquired adequate skills to work as surveyor, drafts man, supervisor and site engineer. Student can work as an assistant to mix designer, project manager and design engineer. After successful completion of this module and some additional practice the student should have attained

- Understanding of concepts, principles and practices in making concrete and concreting operations for different types of civil works
- Analytical ability and understanding of behaviour of various types of soils and their uses for civil works
- Analytical ability and understanding of behaviour of fluid mechanics and its applications
- Analysis and design of simple structural elements in concrete and steel and skill of preparing and reading detailed structural drawings
- Awareness regarding facilities and support system to promote entrepreneurship development
- Ability to use the knowledge of building services in preparing computer based drawings as per requirements
- Design of pavements in transportation engineering
- Ability to perform surveying works for various construction works using digital equipment

3. Bachelor of Vocation in Construction Technology

Outcome: Student shall have acquired adequate skills to work as surveyor, drafts man, supervisor, site engineer, mix designer, Technical Report writer, project manager and design engineer. Further it opens the gates to further vertical mobility in career. After successful completion of this module and some additional practice the student should be able to take up his own self-employment ventures/contracts/projects

Scheme and Syllabi for B. Voc. (Construction Technology), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

- Ability to supervise various civil works such as buildings, industrial structures, bridges, tunnels roads, irrigation structures, water works etc.
- Application of knowledge of planning, scheduling, controlling and skill of advanced surveying in supervising various construction projects
- Skill in managing construction materials, equipment, manpower and cash flow
- Competencies in maintenance, repairs and upkeep of building
- Knowledge of principles of water supply and sanitary engineering and methods of treating water and sewage
- Rigorous training in enhancing communication skills, technical English and interpersonal relations and skills in communication
- Awareness regarding hazards, safety measures at construction site
- Awareness about Contract laws & regulation, Disaster Management, waste management
- Exposure to various computation skills such as MATLAB and Civil engineering design and drafting software
- Ability in preparing computer based structural drawings

Students will be awarded of Diploma:

1. Student shall be required to appear in examinations of all courses. However, to award the Diploma (Construction Technology) a student shall be required to earn a minimum of **60 credits**.

Students will be awarded of Advanced Diploma:

1. Student shall be required to appear in examinations of all courses. However, to award the Advanced Diploma (Construction Technology) a student shall be required to earn a minimum of **120 credits**.

Students will be awarded of B.Voc Degree:

1. Student shall be required to appear in examinations of all courses. However, to award the degree a student shall be required to earn a minimum of **180 credits**.

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**BACHELOR OF VOCATION
BRIDGE COURSE FOR (10+2)/10+ITI STUDENTS
(FOR ALL ENGINEERING DISCIPLINES)
(FIRST SEMESTER EXAMINATION)
(LEVEL-IV)**

Paper Code	Paper ID	Paper	L/T/P	Credits
ETVCT-401		Module-I*	6	6
ETVCT-403		Module-II*	6	6
TOTAL			12	12

No. of Hours: 12 x 15 Hours =180 Hours

**BACHELOR OF VOCATION
BRIDGE COURSE FOR (10+2)/10+ITI STUDENTS
(FOR ALL ENGINEERING DISCIPLINES)
(SECOND SEMESTER EXAMINATION)
(LEVEL-IV)**

Paper Code	Paper ID	Paper	L/T/P	Credits
ETVCT-402		Module-III*	6	6
ETVCT-404		Module-IV*	6	6
TOTAL			12	12

No. of Hours: 12 x 15 Hours =180 Hours

*Non University Examination System (NUES)

NOTE I:

The institute is advised to teach/provide relevant skills through Module I to IV, which are pre-requisite for first year of B.Voc.

OR

Relevant qualification pack in alignment with NSQF Level IV may be taught by the institute, which is pre-requisite for B.Voc.

NOTE II:

Bridge course is to be taught during first year. Evaluation for bridge course modules will be in Non University Examination System (NUES) pattern. Each module will be of 100 marks.

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**BACHELOR OF VOCATION
(CONSTRUCTION TECHNOLOGY)
FIRST SEMESTER EXAMINATION
(LEVEL-V)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVCT-501		Building Construction-I	3	0	3
ETVCT-503		Estimating & Costing-I	3	0	3
ETVAS-505		Applied Mathematics for Construction Technology	3	0	3
ETVHS-519		Communication Skills (Common to all disciplines)	2	1	3
OPEN ELECTIVE-I (Select any one)					
ETVCT-505		Applied Mechanics	3	0	3
ETVAS-503		Applied Physics	3	0	3
GENERAL ELECTIVE-I (Select any one)					
ETVHS-513		Human Values and Professional Ethics	2	0	2
ETVHS-515		Life Skills	2	0	2
ETVHS-517		Personality Development & Behavioural Science	2	0	2
PRACTICAL/VIVA VOCE (Select any one Lab based on OPEN ELECTIVE-I)					
ETVCT-555		Applied Mechanics Lab	0	3	3
ETVAS-553		Applied Physics Lab	0	3	3
PRACTICAL/VIVA VOCE					
ETVCT-551		Building Construction I Lab	0	2	2
ETVCT-553		Estimating & Costing I	0	2	2
ETVEE-557		Basic Electrical Engineering	0	2	2
ETVME-551		Engineering graphics	0	3	3
ETVCT-557		Basic Information Technology Lab	0	2	2
TOTAL			16	15	31

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centres/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

**BACHELOR OF VOCATION
(CONSTRUCTION TECHNOLOGY)
SECOND SEMESTER EXAMINATION
(LEVEL-V)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVCT-502		Building Construction-II	3	0	3
ETVCT-504		Estimating & Costing-II	3	0	3
ETVCT-506		Surveying-I	3	0	3
ETVEN-502		Environmental Science (Common to all disciplines)	3	0	3
OPEN ELECTIVE-II (Select any one)					
ETVCT-508		Construction Materials	3	0	3
ETVEC-506		Basic Electronics	3	0	3
PRACTICAL/VIVA VOCE (Select any one Lab based on OPEN ELECTIVE-II)					
ETVCT-558		Construction Materials Lab	0	2	2
ETVEC-556		Basic Electronics Lab	0	2	2
PRACTICAL/VIVA VOCE					
ETVCT-552		Civil Engineering Drawing Lab	0	3	3
ETVCT-554		Estimating & Costing-II Lab	0	2	2
ETVCT-556		Surveying-I Lab	0	4	4
ETVEN-552		Environmental Science Lab / Field work (Common to all disciplines)	0	2	2
ETVCT-560		Industrial Training-I	0	0	2
ETVCT-562		Project-I	0	6	3
TOTAL			15	19	33

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centers/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

NOTE FOR PROJECT:

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.

BUILDING CONSTRUCTION-I

Paper Code: ETVCT-501
Paper: Building Construction-I

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: Well versed with salient features of site selection, building bye-laws, types of foundations & their suitability, concept of masonry and types, significance and details of floors, lintels & arches, roofs, stairs, damp-proofing, surface finishes, building planning and services, seismic planning and interior design. To have exposure about various components of buildings as required in construction engineering. Urge to thrive and learn and commonsense are pre requisites.

Learning outcomes: The students should be able to visualize the concepts of different components buildings. Ability to perform the task of supervising construction of buildings will be improved. This subject helps in better understanding of the various subjects of this course in later stages.

UNIT-I

Definition of a building, classification of buildings based on occupancy, Site selection: Factors to be considered for selection of site for residential, commercial, industrial and public building, Components of building, arrangement of doors, windows, cupboards etc. for residential building. Concept of foundation and its purpose, Types of foundations-shallow and deep; suitability and use of - Spread foundations, stepped foundation, masonry pillars and concrete columns, raft foundation, combined footing. Thumb rules for depth and width of foundation and thickness of concrete block. Pile foundations; their suitability, classification of piles according to function, material and installation of concrete piles

[T1, T2][No. of Hrs: 11]**UNIT-II**

Masonry, brick masonry-Definition of terms: mortar, bond, facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, header, stretcher, bed of brick, bat, queen closer, king closer, frog and quoin, Bond-meaning and necessity; English bond; Bond only 1, 1-1/2 and 2 Brick thick walls in English Bond. T, X and right-angled corner junctions Thickness for 1, 1-1/2 and 2 Brick square pillars in English bond. Construction of Brick Walls-Method of laying bricks in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing, raking back and block bonding) Construction, expansion and contraction joints; purpose and constructional details. Stone Masonry, glossary of terms-Natural bed, bedding planes, string course, corbel, cornice, block-in course, grouting, mouldings, templates, throating, through stones, parapet, coping, pilaster and buttress. Types of stone Masonry: Rubble Masonry: random and coarsed, Ashlar Masonry: Ashlar fine, Ashlar rough, Ashlar facing, specifications for coarsed rubble masonry, principles to be observed in construction of stone masonry walls.

[T1, T2][No. of Hrs: 11]**UNIT-III**

Surface Finishes: different types, preparations and applications of plastering, pointing, painting, white washing and curing. Damp Proofing: Dampness: sources, causes and its ill effects, Damp proofing materials and their specifications, Methods of damp proofing: basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, WC and kitchen, roofs and window sills, Plinth protection and aprons.

Purpose and Classification of walls- load bearing, non-load bearing, dwarf, retaining, breast walls and partition walls. Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls. Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.

[T1, T2][No. of Hrs: 11]**UNIT-IV**

Scaffolding: Constructional details and suitability of mason's brick layers and tubular scaffolding. **Arches & Lintels:** Meaning and use of arches and lintels: Glossary of terms used in arches and lintels – abutment, pier, arch ring, intrados, soffit, extrados, voussoiers, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, jambs, bearing, thickness of lintel, effective span. Arches: Types of Arches –

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Semi-circular, segmental, elliptical and parabolic, flat, inverted and relieving. Stone arches and their construction, brick arches and their construction. **Doors and Windows:** - Glossary of Terms used in Doors and windows, Doors – name, uses and Types: metal doors, ledged and battened doors, ledged, battened and braced door, framed and panelled doors, glazed and panelled doors, flush doors, collapsible doors, rolling steel shutters, side sliding doors, door frames, PVC shutters and metal doors, Window-names, uses and Types: metal windows, fully panelled windows, fully glazed windows, casement windows, fanlight windows and ventilators, sky light window frames, louvered shutters (emphasis shall be given for using metals and plastics etc. in place of timber).

[T1, T2][No. of Hrs: 12]

Text Book(s):

[T1] Shushil Kumar, “Building Construction”, Standard Publication

[T2] Arora, S.P. and Bindra, S.P.; “A Text Book of Building Construction”; Dhanpt Rai and Sons, New Delhi

References Book(s):

[R1] P.C.Varghese, “Building Construction”, PHI Publications

[R2] Gurucharan Singh: “Building Construction Technology & Materials”, Standard Book House

[R3] M.L. Gambhir and Neha Jamwal, “Building and Construction Materials”, Mc-Graw Hill

[R4] Moorthy, NKR; “A Text Book of Building Construction”, Poona, Engineering Book Publishing Co

[R5] Rangwala, SC: “Building Construction”; Anand, Charotar Book Stall/ Publishing House

ESTIMATING & COSTING-I

Paper Code: ETVCT-503
Paper: Estimating & Costing-I

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: Basic knowledge of building construction, surveying are the prerequisites and enhance ability of understanding of the subject. To study concepts of quantity surveying; To learn different types of estimates; to understand analysis of rates of various building operations; to study the details of contracting; to study billing and valuation. To prepare detailed estimate of a building;

Learning outcomes: Students gain the knowledge of estimating and costing which is an essential requirement of employability. Able to do the quantity surveying work independently. Ability to understand the contracting procedures, billing & valuation aspects further helps in better understanding of intricacies of Civil Engineers role. Improved ability to prepare material estimates for various construction and civil engineering projects.

UNIT-I

Introduction to quantity surveying/ estimating and its importance. Types of estimates; - Preliminary estimates, Plinth area estimate, Cubic rate estimate and Estimate per unit base. Detailed estimates- Definition- Stages of preparation – details of measurement and calculation of quantities and abstract.

[T1, T2][No. of Hrs: 11]**UNIT II**

Units of measurement for various items of work as per BIS:1200. Rules for measurements. Different methods of taking out quantities – Centre line method and long wall & short wall method. Preparation of detailed estimate complete with detailed reports, specifications, abstract of cost and material requirement statements for a small residential building with flat roof.

[T1, T2][No. of Hrs: 11]**UNIT-III:**

Analysis of rates: Detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation.

Steps in the analysis of rates for any item of work: Requirement of materials, labour, sundries, water charges and contractor's profit

[T1, T2][No. of Hrs: 11]**UNIT IV.**

Calculation of quantities of materials for:

- a. Cement mortars of different proportion
- b. Cement concrete of different proportion
- c. Brick/stone masonry in cement mortar
- d. Plastering and pointing
- e. White washing, painting
- f. R.C.C. work in slab, beams.

Running and maintenance cost of construction equipment.

[T1, T2][No. of Hrs: 12]**Text Book(s):**

[T1] B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.

[T2] M .Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot

Reference Book(s):

[R1] D.S.R. [Delhi Schedule Rates] C.P.W.D

[R2] PWD Account Code

[R3] Samuelson and Nardhaus-Economics, Mc Graw Hill

[R4] 'Text book of Estimating and Costing' by G.S.Birdie

[R5] 'Civil Engineering Building Drawing' by Gurucharan Singh

APPLIED MATHEMATICS FOR CONSTRUCTION TECHNOLOGY**Paper Code: ETVAS-505****L T/P C****Paper: Applied Mathematics for Construction Technology****3 0 3****INSTRUCTIONS TO PAPER SETTERS:****MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: To provide the students a strong mathematical background so as to be able to reflect the knowledge in various real life domains, To stress on geometrical interpretation of analytically obtained results, To explore mathematical concepts and develop a wide range of mathematical skills which have direct applications in their respective fields, To facilitate rational thought process and implement mathematics to the sectors they work for, in future.

Learning Outcomes: Use pedagogy of mathematical knowledge flexibly in authentic situations, Identify, analyse and compare different techniques in real life problems in their respective fields, Create a better workforce at a national level and contribute to a systematic solution formation team.

UNIT-I**ALGEBRA**

- (i) Sequence and series. Arithmetic Progression, Geometric progression- general term, sum up to n terms. Infinite geometric series.
- (ii) Logarithm, Laws of Logarithm.
- (iii) Permutations and Combinations: fundamental principle of counting, factorial n, permutations and combinations
- (iv) Vector Algebra: Concept of a vector, position vector of a point, addition and subtraction of vectors, multiplication of a vector by a scalar product, vector of two vectors, application to problems on work done, moment and angular velocity.

[T1, T2][No. of Hrs: 11]**UNIT-II****TRIGONOMETRY**

- (i) Measuring angles in radians and degrees, signs of the trigonometric ratio of angles
- (ii) Sum and difference formulas for trigonometric ratios of angles and their applications and transformation formulae. Multiple and submultiple angles.
- (iii) Properties of triangle
- (iv) Plotting of curves of trigonometric functions.

[T1, T2][No. of Hrs: 11]**UNIT-III****COORDINATE GEOMETRY**

- (i) Straight Lines: Equation of straight line in various standard form, intersection of two straight lines and angle between them, distance of a point from a line.
- (ii) Conic Sections: Sections of a cone: Circle, Ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of Circle, Parabola, Ellipse and Hyperbola.

[T1, T2][No. of Hrs: 11]**UNIT-IV****DETERMINANTS AND MATRICES**

- (i) Determinants: Definitions, Evaluation of a determinant up to order three, minors and cofactors, Properties of determinants, Product of two determinants, adjugate and reciprocal determinants, Cramer's Rule for solving Linear non-homogeneous simultaneous equations.
- (ii) Matrices: Concept of a matrix, definitions, Transpose of a matrix, Symmetric and Skew-Symmetric Matrix, Diagonal Matrix, Unit Matrix, Addition and Multiplication of matrices, Adjoint and Inverse of a matrix, solving simultaneous equations containing up to 3 unknowns only.

[T1, T2][No. of Hrs: 12]

Text Book(s):

- [T1] Applied Mathematics by R.D. Sharma
[T2] Plane Trigonometry by S.L. Loney

Reference Book(s):

- [R1] Applied Maths – Dr. Niraj Pant, King India Publication
[R2] Applied Maths – H.K. Dass, C.B.S. Publication



COMMUNICATION SKILLS
(Common to All Disciplines)

Paper Code: ETVHS-519
Paper: Communication Skills

L	T/P	C
2	1	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** Students should have studied General English up to secondary level and the subject aims at developing communication skills in writing, speaking as well as body language.*

***Learning Outcomes:** The students should be able to communicate effectively to his/her superiors as well as juniors at work place in his/her professional field.*

UNIT-I

Recognizing and Understanding Communication Styles: What is Communication?, Passive Communication, Aggressive Communication, Passive-Aggressive Communication, Assertive Communication, Verbal and Non Verbal Communication, Barriers and Gateways to Communication.

[T1, T2][No. of Hrs. 11]

UNIT-II

Listening Skills: Types of Listening (theory /definition), Tips for Effective Listening Academic Listening-(lecturing), Listening to Talks and Presentations, Basics of Telephone communication

Writing Skills: Standard Business letter, Report writing, Email drafting and Etiquettes, Preparing Agenda and writing minutes for meetings, Making notes on Business conversations, Effective use of SMS, Case writing and Documentation.

[T1, T2][No. of Hrs. 11]

UNIT-III

Soft Skills: Empathy (Understanding of someone else point of view), Intrapersonal skills, Interpersonal skills, Negotiation skills, Cultural Aspects of Communication.

[T1, T2][No. of Hrs. 11]

UNIT-IV

Group Communication: The Basics of Group Dynamics, Group Interaction and Communication, How to Be Effective in Groups, Handling Miscommunication, Handling Disagreements and Conflicts, Constructive Criticism.

[T1,T2][No. of Hrs. 12]

Text Book(s):

- [T1] Mckay, M., Davis, M. & Fanning, P.(2008). Messages: The Communication Skills Book, New Harbinger Publications
- [T2] Perkins, P.S., & Brown, L. (2008). The Art and Science of Communication: Tools for effective communication in the workplace, John Wiley and Sons

Reference Book(s):

- [R1] Krizan et al (2010). Effective Business Communication, Cengage Learning.
- [R2] Scot, O. (2009). Contemporary Business Communication, Biztantra, New Delhi.
- [R3] Chaney & Martin (2009). Intercultural Business Communication, Pearson Education
- [R4] Penrose et al (2009). Business Communication for Managers, Cengage Learning.

APPLIED MECHANICS
(Open Elective-I)

Paper Code: ETVCT-505
Paper: Applied Mechanics

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required to the students for further understanding of other applied subjects. To introduce the concepts of rigid body mechanics for bodies at rest and in motion to students. To make the students appreciate the applications of basic laws of physics to a variety of problems. Inculcating and enhancing analytical skills to solve numerical problems. Upon the completion of course student should be able to understand the importance of mechanics in engineering and various concepts.

Learning outcomes: Students will be able to state the relevant laws and apply them to numerical problems. Students will be able to draw free-body diagrams for a given problem and get the required solution. Students will be able to visualize the applications of basic laws in solving numerical problems. Students will be able to correlate the concepts learnt in the relevant courses of higher classes.

UNIT-I:

Introduction- Concept of mechanics and applied mechanics – Explanation of mechanics and applied Mechanics, its importance and necessity, giving suitable examples on bodies at rest and in motion, explanation of branches of this subject.

Laws of Forces- Force and its effects. Units and measurement of force. Characteristics of force vector representation. Bow's notation. Types of forces, action and reaction, tension & thrust. Force systems: Coplanar and space force systems. Coplanar, concurrent and non-concurrent forces. Free body diagrams. Resultant and components of forces, concept of equilibrium; parallelogram law of forces. Equilibrium of two forces, superposition and transmissibility of forces, Newton's third law, triangle law of forces, different cases of concurrent coplanar, two forces systems, extension of parallelogram law and triangle law to many forces acting at one point-polygon law of forces, method of resolution into orthogonal components for finding the resultant, graphical methods, special case of three concurrent, coplanar forces, Lami's theorem. **(simple numericals should be given in examination)**

[T1, T2, T3][No. of Hrs: 11]

UNIT-II:

Moments- Concept of moment, Varignon's theorem – statement only. Principle of moments – application of moments to simple mechanism. Parallel forces, like and unlike parallel forces, calculation of their resultant, concept of couple, moving a force parallel to its line of action, general cases of coplanar force system, general conditions of equilibrium of bodies under coplanar parallel forces.

Friction- Concept of friction, laws of friction, limiting friction and coefficient of friction, sliding friction and rolling friction, inclined plane.

[T1, T2, T3][No. of Hrs: 11]

UNIT-III:

Centre of Gravity and Centroid- Concept of gravity, gravitational force, Centroid and centre of gravity. Centroid for regular lamina and center of gravity for regular solids. Position of centre of gravity of compound bodies and centroid of composite area. CG of bodies and areas with portions removed.

Moment of Inertia of Plane Areas- Concept of Moment of Inertia and second moment of area and Radius of gyration, theorems of parallel and perpendicular axes, second moment of area of common geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for L, T and I sections. Section modulus without derivation.

[T1, T2, T3][No. of Hrs: 11]

UNIT-IV

Laws of Motion- Concept of momentum, Newton's laws of motion, their application, derivation of force equation from second law of motion, numerical problems on second law of motion, piles, lifts, bodies tied with string, Newton's third law of motion numerical problems, conservation of momentum, impulse and impulsive force (definition only).

Simple Lifting Machines- Concept of machine, mechanical advantage, velocity ratio and efficiency of a machine, their relationship, law of machine, simple machines (lever, wheel and axle, pulleys, jacks winch crabs only).

[T1, T2, T3][No. of Hours: 12]

Text Book(s):

- [T1] A.K.Tayal, "Engineering Mechanics: Statics and Dynamics", Umesh publications
- [T2] R.K. Rajput, "Applied Mechanics", Lakshmi Publications
- [T3] A. K. Upadhyay, "Applied Mechanics, Kataria Publications

References Book(s):

- [R1] Beer and Johnston, "Mechanics for Engineers (Statics and Dynamics)", McGraw Hill Co. Ltd.
- [R2] R. S. Khurmi, "Applied Mechanics", S. Chand publications
- [R3] Hibbeler R C, "Engineering Mechanics: Statics, Low Price Edition", Pearson Education
- [R4] Hibbeler R C, "Engineering Mechanics: Dynamics, Low Price Edition", Pearson Education
- [R5] Timoshenko, S.P., and Young, D.H., "Engineering Mechanics", McGraw Hill international
- [R6] V.S. Mokashi, "Engineering Mechanics Vol. I and II", Tata McGraw Hill Publishing Co. ltd., New Delhi

APPLIED PHYSICS
(Open Elective-I)

Paper Code: ETVAS-503
Paper: Applied Physics

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

***Objective/Prerequisites:** Applied physics is a foundation course introduced in bridge course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. To study and understand basics and concepts of Measurements, waves, acoustics, Light, Geometrical Optics, Laser and its Applications, Radioactivity and Detection of Radiations.*

***Learning outcomes:** To Visualize of various concepts of applied physics. Helpful to students in better understanding of engineering subjects in later stages of the course.*

UNIT I:

Measurements:- Units and Dimensions- measurements in engineering and science, Fundamental and derived quantities and units, different system of units, dimensions of physical quantities, dimensional formula and dimensional equation, classification of physical quantities, principles of homogeneity of dimensions and applications of homogeneity principle in: a) Checking the correctness of physical equation b) Deriving relations among various physical quantities c) Conversion of numerical values of physical quantities from one system of units into other system. Draw backs (limitations) of dimensional analysis. Errors in measurement, accuracy, estimation of percentage error in the result of measurements.

[T1, T2][No. of Hrs: 11]

UNIT II:

Waves- Generation of waves by vibrating particles, progressive wave, equation of waves, energy transfer by particles and waves, superposition of waves and its applications to interference, beats and stationary waves (graphical); sound and light as wave – range of frequencies, wavelengths, velocities and their nature, electromagnetic spectrum.

Sound- Acoustics: Reflection, refraction and absorption of sound waves by materials; definition of pitch, loudness, quality and intensity of sound waves, units of intensity (bel and decibel); Echo and reverberation and reverberation time, control of reverberation time. Acoustic insulation (qualitative treatment only of reverberation). **Ultrasonic-** Production of ultrasonic waves by magnetostriction and piezoelectric effect, detection and properties of ultrasonic; applications to drilling, cold welding, cleaning, flaw detection and exploration (sonar).

[T1, T2][No. of Hrs: 11]

UNIT III:

Light Geometrical Optics: Defect in image formation, eyepieces construction and principles of preparation of telephoto and zoom lens, principle of optical projectors, optical principles of OHP and slide film projectors.

[T1, T2][No. of Hrs: 11]

UNIT IV

Laser and its Applications- Laser principle, types of Lasers; detailed study of the He-Ne and Ruby lasers and their applications. Fluorescent tube; mercury arc light, xenon source, sodium lamp.

Radioactivity and Detection of Radiations- Natural radioactivity; half-life; decay constant; mean life; radioactive transformation. Principles of nuclear fission and fusion; energy generation. Source of background radiations; health Hazards of radiations. Units of radiation.

[T1, T2][No. of Hrs: 12]

Text Book(s):

- [T1] Engineering Physics. Authors, GAUR R K, GUPTA S L. Publisher, PHI Learning Pvt. Ltd.
[T2] Basic Applied Physics: For the Polytechnic Students. Author, R. K. Gaur. Edition, 2. Publisher, Dhanpat Rai & sons.

HUMAN VALUES AND PROFESSIONAL ETHICS
(General Elective-I)

Paper Code: ETVHS-513

Paper : Human Values and Professional Ethics

L	T/P	C
2	0	2

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: *This introductory course input is intended*

- a. *To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.*
- b. *To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on the correct understanding of the Human reality and the rest of the Existence. Such a Holistic perspective forms the basis of value-based living in a natural way.*
- c. *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.*

UNIT-1: Introduction to Value Education

1. Understanding the need, basic guidelines, content and process for value education.
2. Basic Human Aspirations: Prosperity and happiness
3. Methods to fulfil the human aspirations – understanding and living in harmony at various levels.
4. Practice Session – 1.

[T1], [R1], [R4][No. of Hrs. 07]

UNIT-2: Harmony in the Human Being

1. Co-existence of the sentient "I" and the material body—understanding their needs—Happiness & Conveniences.
2. Understanding the Harmony of "I" with the body—Correct appraisal of physical needs and the meaning of prosperity.
3. Programme to ensure harmony of "I" and Body-Mental and Physical health and happiness.
4. Harmony in family and society: Understanding Human-human relationship in terms of mutual trust and respect.
5. Understanding society and nation as extensions of family and society respectively.
6. Practice Session – 02

[T2], [R1],[R2][No. of Hrs. 08]

UNIT-3: Basics of Professional Ethics

1. **Ethical Human Conduct** – based on acceptance of basic human values.
2. **Humanistic Constitution and universal human order** – skills, sincerity and fidelity.
3. **To identify the scope and characteristics of people** – friendly and eco-friendly production system, Technologies and management systems.
4. Practice Session – 03.

[T1],[R4]][No. of Hrs. 07]

UNIT-4: Professional Ethics in practice

1. **Profession and Professionalism** – Professional Accountability, Roles of a professional, Ethics and image of profession.
2. **Engineering Profession and Ethics** - Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
3. **Professional Responsibilities** – Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing
4. Practice Session – 04

[T1], [T2], [T3], [R3][No. of Hrs. 08]

Text Book(s):

- [T1] Professional Ethics, R. Subramanian, Oxford University Press.
- [T2] Professional Ethics & Human Values: S.B. Srivastha, SciTech Publications (India) Pvt. Ltd. New Delhi.
- [T3] Professional Ethics & Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Education.

[T4] Professional Ethics & Human Values: S.B. Srivasthva, SciTech Publications (India) Pvt. Ltd. New Delhi.

References Book(s):

- [R1] Success Secrets for Engineering Students: Prof. K.V. SubbaRaju, Ph.D., Published by SMART student.
 [R2] Ethics in Engineering Mike W. Martin, Department of Philosophy, Chapman University and Roland Schinzinger, School of Engineering, University of California, Irvine.
 [R3] Human Values: A. N. Tripathy (2003, New Age International Publishers)
 [R4] Value Education website, <http://www.universalhumanvalues.info>[16]
 [R5] Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press.
 [R6] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Books (2010, New Delhi). Also, the Teachers' Manual by the same author.

***PRACTICAL SESSIONS OF 14 HOME ASSIGNMENTS** will be followed by the students pursuing this paper. (Ref: Professional Ethics & Human Values: S.B. Srivastava, SciTech Publications (India) Pvt. Ltd. New Delhi.)

CONTENT OF PRACTICE SESSION

Module 1: Course Introduction – Needs, Basic Guidelines, Content and Process of Value Education

PS-1: Imagine yourself in detail. What are the goals of your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcoming in your life? Observe and analyze them.

Expected Outcome:

The students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

PS-2: Now a days there is lot of voice about techno-genie maladies such as energy and natural resource depletion, environmental Pollution, Global Warming, Ozone depletion, Deforestation, etc. – all these scenes are man-made problems threatening the survival of life on the earth – what is root cause of these maladies and what is the way out in your opinion?

On the other hand there is rapidly growing danger because of nuclear proliferation, arm race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression and suicidal attempts, etc - what do you think the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

Expected Outcome:

The students start finding out that technical education with study of human values can more solutions than problems. They also start feeling that lack of understanding of human values is the root cause of all the problems and the sustained solution could emerge only through understanding of human values and value based living. Any solutions brought out through fear, temptation or dogma will not be sustainable.

PS-3: 1. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of following:

- a) What is naturally acceptable to you in relationship – feeling of respect or disrespect?
- b) What is naturally acceptable to you - to nurture or to exploit others? Is your living the same as your natural acceptance or different?

2. Out of three basic requirements for fulfillment of your aspirations, right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time and efforts you devote for each in your daily routine.

Expected Outcome:

1. The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify the right or wrong, and referring to any external source life text or instrument or any other person cannot enable them to verify with authenticity, it will only develop assumptions.

2. The students are able to see that their practice in living is not in harmony with their natural acceptance at most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.
3. The students are able to see that lack of right understanding leading to lack of relationship is the major cause of the problems in their family and the lack of physical facilities in most of the cases; while they have given higher priority to earning of physical facilities in their life ignoring relationship and not being aware that right understanding is the most important requirement for any human being.

Module 2: Understanding harmony in human being – Harmony in myself!

PS-4: Prepare the list of your desires. Observe whether the desires are related with self “I” or body. If it appears to be related with the both, see which part of it is related to self “I” and which part is related to body.

Expected Outcome:

The students are able to see that they can enlist their desires and the desires are not vague, also they are able to relate their desires to “I” and “body” distinctly. If, any desire appears to be related with both, they are able to see that feeling is related to “I” while the physical facility is related to the body. They are also able to see that “I” and “body” are two realities, and most of their desires are related to “I” and not with the “Body”; while their efforts are mostly connected on the fulfillment of the need of the body assuming that it will meet the needs of “I” too.

PS-5:

1. {A}. Observe that any physical facilities you use, follows the given sequence with time; Necessary and tasteful – unnecessary & tasteful – unnecessary & tasteless.
 {B}. In contrast, observe that any feelings in you are either naturally acceptable or not acceptable at all. If, naturally acceptable, you want it continuously and if not acceptable, you do not want it at any moment.
2. List Down all your activities. Observe whether the activity is of “I” or of “body” or with the participation both “I” and “body”.
3. Observe the activities with “I”. Identify the object of your attention for different moments (over a period say 5 to 10 minute) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Expected Outcome:

1. The students are able to see that all physical facilities they use are required for limited time in a limited quantity. Also they are able to see that cause of feeling, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.
2. The students are able to see that activities like understanding, desires, thoughts and selection are the activities of “I” only; the activities like breathing, palpitation of different parts of the body are fully the activities of the body. With the acceptance of “I”, while activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs, etc. are such activities that require the participation of both “I” and “body”
3. The students become aware of their activities of “I” and start finding their focus of attention at different moments. Also they are able to see that most of their desires are coming from outside (through preconditioning or sensation) and are not based on their natural acceptance.

- PS-6:**
1. Chalk out the program to ensure that you are responsible to your body – for the nurturing, protection and right utilization of the body.
 2. Find out the plants and shrubs growing in and your campus. Find out their use for curing different diseases.

Expected Outcome:

The students are able to list down activities related to a proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing the different diseases.

Module 3: Understanding harmony in the family and society - Harmony in Human – Human relationship

PS-7: Form small groups in the class and in that group initiate the dialogue and ask the eight questions related to trust. The eight questions are-

S.No.	Intention (Natural Acceptance)	S.No.	Competence
1.a.	Do I want to make myself happy?	1.b.	Am I liable to make myself always Happy?
2.a.	Do I want to make the other happy?	2.b.	Am I liable to make the other always happy?
3.a.	Does the other want to make him happy?	3.b.	Is the other able to make him always happy?
4.a.	Does the other want to make me happy? What is answer?	4.b.	Is the other able to make me always happy? What is answer?

Let each student answer the question for himself and everyone else. Discuss the difference between intention and competence.

Expected Outcome:

The students are able to see that the first four questions are related to our natural acceptance i.e. intention and the next four to our competence. They are able to note that the intention is always correct, only competence is lacking. We generally evaluate ourselves on the basis of our intention and other on the basis of their competence. We seldom look at our competence and other's intention as a result we conclude that I am a good person and other is a bad person.

PS-8:

1. Observe that on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasion you are disrespecting by way of under evaluation, over evaluation or otherwise evaluation.
2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

Expected Outcome:

The students are able to see that respect is right evaluation and only right evaluation leads to fulfilment of relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect) like gender biasness, generation gap, caste conflicts, class struggle, and domination through poor play, communal violence, and clash of isms and so on so forth.

All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

PS-9:

1. Write a note in the form of a story, poem, skit, essay, narration, dialogue, to educate a child.
Evaluate it in a group.
2. Develop three chapters to introduce "social science", its needs, scope and content in the primary education of children.

Expected Outcome:

The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

Module 4: Understanding harmony in the nature and existence – Whole existence as Co – existence -

PS-10: Prepare the list of units (things) around you. Classify them into four orders. Observe and explain the mutual fulfilment of each unit with other orders.

Expected Outcome:

The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them. They are also able to see that human beings are not fulfilling to their orders today and need to take appropriate steps to ensure right participation (in term of nurturing, protection and right utilization) in the nature.

Scheme and Syllabi for B. Voc. (Construction Technology), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

PS-11:

1. Make a chart for the whole existence. List down different courses of studies and relate them to different or levels in the existence.
2. Choose any one subject being taught today. Evaluate and suggest suitable modifications to make it appropriate and holistic.

Expected Outcome:

The students are confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are liable to make out how these courses can be made appropriate and holistic.

Module 5: Implication of the above Holistic Understanding of Harmony at all Levels of Existence.

PS-12: Choose any two current problem of different kind in the society and suggest how they can be solved on the basis of the natural acceptance of human values. Suggest the steps you will take in present conditions.

Expected Outcome:

The students are liable to present sustainable solutions to the problem in society and nature. They are also able to see that these solutions are practicable and draw road maps to achieve them.

PS-13:

1. Suggest ways in which you can use your knowledge of engineering / technology / management for universal human order from your family to world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

Expected Outcome:

The students are able to grasp the right utilization of their knowledge in their streams of technology / engineering / management to ensure mutually enriching and recyclable production systems.

PS-14: The course is going to be over now. Evaluate your state before and after the course in terms of-

- Thoughts
- Behaviour
- Work and
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

Expected Outcome:

The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for happy and prosperous society.

LIFE SKILLS
(General Elective-I)

Paper Code: ETVHS-515
Paper: Life Skills

L	T/P	C
2	0	2

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** Students should have studied subjects such as General languages, social studies and Moral education at school level. The objective of this subject is to prepare the students to become a good citizen and a professional useful to the society.*

***Learning Outcomes:** The knowledge of this subject will give the student a value system which will help him in taking decisions in professional and social life for the benefit of society at large.*

UNIT-I

Introduction: Definition and importance of Life Skills, Livelihood Skills, Survival Skills, Life Skills Approach, Life Skills based education, Life Skills Training- Implementation Models

[T1,T2][No. of Hrs. 07]

UNIT-II

Learning and Performance, Cognitive Development, Maturation, Adult Learning, Approaches to Learning Pillars of Education and Life Skills- Four Pillars: Learning to Know, Learning to Do, Learning to Live Together, Learning to be learning throughout Life

[T1,T2][No. of Hrs. 08]

UNIT-III

Social Skills and Negotiation Skills: Self Awareness, Empathy, Effective Communication, Interpersonal Relationships

Thinking Skills: Nature, Element of Thought, Types, Concept Formation, Reasoning, Creative and Critical Thinking

[T1,T2][No. of Hrs. 08]

UNIT-IV

Coping Skills: Coping with Emotions, Coping with Stress, Integrated use of thinking skills, social skills and coping skills

[T1,T2][No. of Hrs. 07]

Text Books:

[T1] Rajasenan, N.V. (2010). Life Skills, Personality and Leadership, Rajiv Gandhi National Institute of Youth Development, TamilNadu

[T2] Duffy, Grover,K., Eastwood, A. (2008). Psychology for Living-Adjustment, Growth and Behaviour Today, Pearson Education

Reference Books:

[R1] Debra McGregor, (2007), "Developing Thinking; Developing Learning - A Guide to Skills in Education", Open University Press, New York, USA

[R2] Singh Madhu, (2003). "Understanding Life Skills, Background paper prepared for Education for All: The Leap to Equality"

[R3] Nair. A. Radhakrishnan, (2010). "Life Skills Training for Positive Behaviour", Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.

[R4] Dahama O.P., Bhatnagar O.P, (2005). "Education and Communication for Development, (2nd Ed.)", Oxford& IBH Publishing Co. Pvt. Ltd. New Delhi

PERSONALITY DEVELOPMENT & BEHAVIOURAL SCIENCE
(General Elective-I)

Paper Code: ETVHS-517	L	T/P	C
Paper: Personality Development & Behavioural Science	2	0	2

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** Students should have studied subjects such as General languages, social studies and Moral education at school level. The objective of this subject is to prepare the students to become a good citizen and a professional useful to the society.*

***Learning Outcomes:** The knowledge of this subject will give the student a value system which will help him in taking decisions in professional and social life for the benefit of society at large.*

UNIT-I

Definition and Basics of Personality, Understanding Traits and Types of Personality, Analyzing strength and weakness (SW), Body Language

[T1, T2][No. of Hrs. 07]**UNIT-II**

Business Etiquettes and Public Speaking: Business Manners. Body Language Gestures, Email and Net Etiquettes, Etiquette of the Written Word, Etiquettes on the Telephone, Handling Business Meetings; Introducing Characteristic, Model Speeches, Role Play on Selected Topics with Case Analysis and Real Life Experiences.

[T1, T2][No. of Hrs. 08]**UNIT-III**

How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation, Boredom Factors in Presentation and How to Overcome them, Interactive Presentation & Presentation as Part of a Job Interview, Art of Effective Listening.

Resume Writing Skills, Guidelines for a Good Resume, How to Face an Interview Board, Proper Body Posture, Importance of Gestures and Steps to Succeed in Interviews. Practice Mock Interview in Classrooms with Presentations on Self; Self Introduction – Highlighting Positive and Negative Traits and Dealing with People with Face to Face.

[T1, T2][No. of Hrs. 08]**UNIT-IV**

Coping Management, Working on Attitudes: Aggressive, Assertive and Submissive Coping with Emotions, Coping with Stress

[T1, T2][No. of Hrs. 07]**Text Books:**

- [T1] McGraw, S. J., (2008), “Basic Managerial Skills for All, Eighth Edition”, Prentice Hall of India.
[T2] The Results-Driven Manager (2005). Business Etiquette for the New Workplace: The Results-Driven Manager Series (Harvard Results Driven Manager)

Reference Books:

- [R1] Pease, A. & Pease, B. (2006)., “The Definitive Book of Body Language”, Bantam Books.
[R2] Scannell, E. & Rickenbacher, C. (2010)., “The Big Book of People Skills Games: Quick, Effective Activities for Making Great Impressions, Boosting Problem-Solving Skills and Improving Customer Service”, McGraw Hill Education

APPLIED MECHANICS LAB
(Open Elective-I)

Paper Code: ETVCT-555
Paper: Applied Mechanics Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Verification of the laws of polygon of forces.
2. To verify the forces in the different members of a jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find out centre of gravity of regular and irregular laminas.
5. To verify the principle of moments using the bell crank lever apparatus.
6. To determine the coefficient of static friction between two surfaces.
7. To find moment of inertia of a flywheel.
8. To find the mechanical advantage, velocity ratio and efficiency in the case of inclined planes.
9. To find the mechanical advantage, velocity ratio and efficiency in the case of Screw Jack.
10. To find the mechanical advantage, velocity ratio and efficiency in the case of worm and worm wheel.
11. To find the mechanical advantage, velocity ratio and efficiency in the case of single winch Crab.
12. Graphical solutions for the following problems:
 - a. Resultant of Coplanar Non Concurrent force system:
 - i. One problem with resultant as a force
 - ii. One problem with resultant as a couple
 - b. Equilibrium of Coplanar Non Concurrent force system: one Problem
 - c. Friction: One Problem

INSTRUCTIONAL STRATEGY

This is a gateway subject to remaining course. While imparting theoretical instructions, teachers are expected to demonstrate the various apparatus and related concepts to the students by correlating theory and practical. It is further recommended that more emphasis should be laid in conducting practical work by individual students.

APPLIED PHYSICS LAB
(Open Elective-I)

Paper Code: ETVAS-553
Paper: Applied Physics Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

Instructions: Twelve Experiments are to be chosen from the list given below and rest of the Experiments (i.e., three in number) may be designed by the faculty at the respective institute according to the Syllabus being taught.

1. To determine the wavelength of sodium light by Newton's Rings.
2. To determine the wavelength of sodium light by Fresnel's biprism.
3. To determine the wavelength of sodium light using diffraction grating.
4. To measure small thickness of a piece of paper using Newton's Rings technique.
5. To determine the refractive index of a prism using spectrometer.
6. To determine the dispersive power of prism using spectrometer and mercury source.
7. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
8. To find the wavelength of He-Ne laser using transmission diffraction grating.
9. To determine the numeral aperture (NA) of an optical fibre.
10. To determine the e/m ratio of an electron by J.J. Thomson method.
11. To measure time period of a waveform and calculate its frequency and wavelength using CRO.
12. To measure the frequency of a sine-wave voltage obtained from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave signals from two signal generators.
13. To determine the frequency of A.C. mains by using Sonometer .
14. To determine the frequency of electrically maintained tuning fork by Melde's method.
15. Computer simulation (simple application of Monte Carlo): Brownian motion, charging & discharging of a capacitor.
16. To study the charging and discharging of a capacitor and to find out the time constant.
17. To study the Hall effect.
18. To determine the energy band gap of a semiconductor by four probe method/or by measuring the variation of reverse saturation current with temperature.
19. To study the V-I characteristics of Zener diode.
20. To measure surface tension of different liquids using capillary rise method.
21. To measure coefficient of viscosity by Stoke's method.

Text Book(s):

[T1] C. L. Arora 'B. Sc. Practical Physics' S. Chand

BUILDING CONSTRUCTION-I LAB**Paper Code: ETVCT-551****L T/P C****Paper: Building Construction-I Lab****0 2 2**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Demonstration of tools and plants used in building construction
2. Study of layout of building
3. Preparation of mortar and cement concrete
4. Importance of form work and material used in form work
5. To construct brick bonds (English bond only) in one, one and half and two brick thick walls
6. To study and construct English bond for L junction/ T junction/ cross junction/ for columns
7. Differentiate and demonstrate steel reinforcement bars of different diameters (plain bar, ribbed, tor steel etc.)
8. To study Slab, lintel & sunshade, column & footing and beam reinforcement
9. Field visit to construction sites:
 - i. Construction of foundations
 - ii. Masonry works
 - iii. Flooring: Laying of flooring on an already prepared lime concrete base
 - iv. Plastering & pointing, White & colour washing
 - v. Damp proof courses
 - vi. Shuttering/cranes/heavy machines in construction work

NOTE: Experts may be invited from field/industry for expert lectures

While imparting instructions in this subject, teachers are expected to take students to work site and explain constructional process and special details for various sub-components of a buildings. It is also important to make use of audio visual aids/video films (if available) to show specialized operations. The practical work should be given due importance and efforts should be made that each student should perform practical work independently. For carrying out practical works, institutes shall develop building yard where enough raw materials is made available for students to perform practical work.

ESTIMATING & COSTING-I LAB**Paper Code: ETVCT-553****Paper: Estimating & Costing-I Lab**

L	T/P	C
0	2	2

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

A. Detailed estimate for building taking of quantities for all items of works in the following types of building:

- 1) A small residential building
(1 BHK & 2 BHK with RCC roof)
- 2) Two storeyed building (framed structure) with RCC roofs.
- 3) Cottages with sloped RCC roofs.
- 4) Industrial buildings with AC / GI sheet roof with steel trusses.
- 5) Taking out quantities for embankment and canals

B. Rate analysis for following item of works.

- 6) A) Brick work for super structures B) PCC work for footing.
- 7) RCC work for beam, Column and slabs.
- 8) A) Plaster work & B) White/ Colour washing

BASICS ELECTRICAL ENGINEERING LAB**Paper Code: ETVEE-557****L T/P C****Paper: Basics of Electrical Engineering****0 2 2**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in Electrical shop.
3. Familiarization with various electrical tools and safety measures
4. Study of various types of wirings: conduit/concealed/batten etc
5. Study of distribution boards
6. Various types of faults in house wiring
7. Use of Megger for testing wiring
8. Study of protection devices- fuse, MCB, ELCB/RCCB etc
9. Measurement of earth resistance
10. Study of various home appliances/ different types of earthing/ single and three phase induction motor/ firefighting equipment
11. Field visit to electrical substation- indoor/ outdoor

ENGINEERING GRAPHICS

Paper Code: ETVME-551
Paper: Engineering Graphics

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. A) Study of Drawing Office Practice tools- Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards, drafting table/board. B) To draw and practice:
 - i. Different types of Lines and Free Hand Sketching (minimum 1 sheet).
 - ii. Different types of lines in engineering drawing as per BIS specifications.
 - iii. Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses.
2. A) Lettering Techniques and Practice:
 - i. Instrumental single stroke (capital and inclined) lettering of 35 mm height in the ratios of 7:4.
 - ii. Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4. B) Dimensioning-
 - i. Necessity of dimensioning, terms and notations – methods and principles, dimensioning small components (practice & theoretical instructions).
 - ii. Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches – chain and parallel dimensioning.
3. Scales
 - i. Need and importance, Definition of representative fraction (RF); Find RF of a given scale.
 - ii. Study Types of scales.
 - iii. Construction of plain and diagonal scales.
4. A) Principle of orthographic projection & Projection of points situated in different quadrants. B) Projection of lines, Lines inclined to one plane and parallel to the other and vice versa.
5. Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa.
6. Sectional views-
 - i. Cutting planes methods of representing sections
 - ii. Conventional sections of various material
 - iii. Classification of sections
 - iv. Conventions in sectioning
7. Drawing of full section, half section, partial or broken out section, offset sections, revolved sections & removed sections. Exercises on sectional views of different objects.
8. Drawing of different conventions for materials in sections. Conventional breaks for shafts, pipes: Rectangular /square/circular, angle, channel and Rolled sections.
9. Fundamentals of isometric projections and draw Isometric views from given orthographic views
10. Symbols, Conventions and simple drawing of Sanitary fitting symbols
11. Draw the Electrical fittings Symbols for domestic interior installations
12. Building plan drawing with Electrical and Civil Engineering symbols.

References Books:

- [R1] ND Bhatt, V.M. Panchal, Engineering Drawing-Planes & Solid Geometry”, Charotar publishing house Principles of Building Drawing by MG Shah and CM Kale, MacMillan, Delhi
- [R2] Zaidi, SKA and Siddiqui, Suhail; “Drawing and Design of Residential and Commercial Buildings”, Standard Publishers and Distributors, Delhi.
- [R3] Surjit Singh, “Engineering Drawing: A Text Book of Engineering Drawing, Dhanpat Rai & Co.

BASIC INFORMATION TECHNOLOGY LAB

Paper Code: ETVCT-557

L T/P C

Paper: Basic Information Technology Lab

0 2 2

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

Objectives & Prerequisites: To study and understand various features of C/C++. To be in a position to write programs involve general logic and technical in nature. Basic mathematical knowledge, basics of information technology and willingness to excel in computer programming are the basic prerequisites.

Basic mathematical knowledge and willingness to excel are the basic prerequisites.

Learning outcomes: This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity. Being a bridge course it helps in understanding of software and CAD in the later stages of the course. Useful in preparing project reports in both academic and professional fronts.

1. Introduction to programming- "C/C++"
 - a) Development of C, starting with C- alphabets, digits, special symbols
 - b) Constants, variables and special symbols
 - c) Instructions
2. Study of C- pre-processor features
3. Study of structures- case control structures, loops control structures and decision control structures
4. Study of input output functions, types of functions
5. Study of file concept- opening, reading, closing, writing etc
6. Study and use of concept of pointers
7. Study the concept of arrays
8. Programming based on above concepts

Note:

Explanation of Introductory part and theory should be dovetailed with practical work. Emphasis should be more on programming techniques rather than language itself. Students are encouraged to develop algorithms of programs and practicing in the laboratory along with the practical exercises. There will not be any theory examination.

References Books:

- [R1] Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
- [R2] Fundamentals of Computer by EBalagurusamy, Tata McGraw Hill Education Pvt. Ltd, New Delhi
- [R3] Programming with C by Byron Gottfried, Schaum's outline series, McGraw Hill Education series.
- [R4] Programming in ANSI C by E. Balaguswamy, McGraw Hill Education series

BUILDING CONSTRUCTION-II

Paper Code: ETVCT-502
Paper: Building Construction-II

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: To cover the study of building planning aspects of various residential, commercial and hospital buildings, planning of various projects. To learn and understand building byelaws and their applicability; principles of planning; importance of orientation and CAD; To understand the basics of construction technology; to study the significance of quality and safety; To study the nuances of concrete and concrete technology. To understand different stages of preparation of concrete & significant types of concretes; To study the concept of Non-destructive testing. The pre requisite knowledge on building components and construction is necessary.

Learning outcomes: After completing this course, student will be able to visualize the concept and applicability of building bye-laws and implement the same in planning and construction. Shall acquire the required planning skills and in a position to suggest plans for various buildings. Enhanced confidence and understanding of various aspects of construction technology, enables him in making better engineer. Knowledge of concrete, concreting and their types is immensely useful in construction sites. This subject helps in understanding the various subjects of this course in later stages.

UNIT-I

Floors, Ground floors- glossary of terms: floor finish, topping, under layer, base course, rubble filling, dado and their purpose. Types of floor finishes –cast-in-situ, concrete flooring (monolithic, bonded) Terrazzo flooring, Stone flooring(marble/Granite), Timber flooring, PVC floor, ceramic floor description with sketches and the methods of construction of the floors and their specifications, floor polishing. Upper floors- flooring on RCC slab, Maintenance of floors. Types of roofs, concept of flat, pitched, arched and cell roofs, Glossary of terms for pitched roofs – Various types of Trusses: Timber and steel, batten, eaves, barge, fascia board, gable hip, lap, purlin, rafter, rag bolt, valley, ridge, etc. Stairs- Glossary of terms: different means of access to various floor, stair case, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand rail, nosing, etc. Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout-straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair. Introduction to anti-termite measures; building services; earthquakes: Magnitude and intensity, seismic zoning, seismograph, Precautions to be observed in the design of earthquake prone buildings.

[T1, T2][No. of Hrs: 11]**UNIT-II**

Building bye-Laws- Introduction, Terminology, Objectives, Floor area ratio (FAR) and Floor space Index (FSI), Principles underlying building byelaws, Minimum plot sizes and building frontage, Open spaces, Minimum standard dimensions of building elements. Provisions for - lighting & ventilation, safety from fire & explosions, means of access, drainage & sanitation and safety of works against hazards or accidents. Requirements for- off street parking, green belt and landscaping, special requirements for low income housing, Sizes of structural elements and Applicability of the bye-laws. Climate and its influence on building planning- Solar radiation, Temperature of air, Wind, Humidity, Precipitation, Climatic zones, Climate and comfort, Earth and its motion, Directions and their characteristics, Landscaping.

[T1, T2, T3][No. of Hrs: 11]**UNIT-III**

Principles of Planning of Buildings- Aspect, Prospect, Privacy, Furniture requirement, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Cleanliness, Flexibility, Elegance, Economy, Practical Considerations.

Orientation Of Buildings- Introduction, Orientation, Factors affecting orientation, Sun, Wind, Rain, C.B.R.I.: Suggestions for obtaining optimum orientation, Orientation criteria for Indian conditions. Economy Measures in Building Construction- General, Economy of land, material of construction, labour, time and money spending.

[T1, T2, T3][No. of Hrs: 11]

UNIT-IV

Fundamentals of Construction Technology- brief introduction to definition and discussions, construction activities and processes, construction workers and estimating; construction scheduling, productivity and mechanization, documents and records, quality, safety and codes & regulations. Site lay out and infrastructure development. Transportation and handling- road, railway, water way and airway. Fabrication of structural steel and erection of steel structures, erection of precast reinforced concrete structures. Quality control and assurance-definitions and introduction to ISO 900 quality systems. **Safety**—basic principles on safety, housekeeping, personal safety, fire protection, electrical safety, mechanical handling, transportation, scaffolds & ladders, excavation, formwork and concreting.

[T1, T2, T3][No. of Hrs: 12]

Text Books:

- [T1] Kumara swamy and Kameswara Rao, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
 [T2] Shushil Kumar, “Building Construction”, Standard Publication
 [T3] Subir K Sarkar, SubhajitSaraswati, Construction Technology, Oxford University Press

References Books:

- [R1] [Dr. H. J. Shah](#), Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
 [R2] Malik, R. S., “Civil Engineering Drawing”, Asia Publishing House
 [R3] Shah, M. G. and Kale, C. M., “Principles of Building Drawing”, MacMillan, Delhi
 [R4] Neville, A. M. and Brooks, J. J., “Concrete Technology”, Pearson Publications

ESTIMATING & COSTING-II

Paper Code: ETVCT-504
Paper: Estimating & Costing-II

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: Basic knowledge of building construction, surveying are the prerequisites and enhance ability of understanding of the subject. To study concepts of quantity surveying; To learn different types of estimates; to understand analysis of rates of various building operations; to study the details of contracting; to study billing and valuation. To prepare detailed estimate of a building;

Learning outcomes: Students gain the knowledge of estimating and costing which is an essential requirement of employability. Able to do the quantity surveying work independently. Ability to understand the contracting procedures, billing & valuation aspects further helps in better understanding of intricacies of Civil Engineers role. Improved ability to prepare material estimates for various construction and civil engineering projects.

UNIT-I

Contracting: Meaning of contract, Qualities of a good contractor, Essentials of a contract, Types of contracts, their advantages, disadvantages and suitability, system of payment. Single and two cover-bids;

[T1, T2][No. of Hrs: 11]

UNIT-II:

Tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Types of contracting firms/ construction companies. Introduction to CSR and calculation of cost based on premium on Common Schedule Rates (CSR).

[T1, T2][No. of Hrs: 11]

UNIT-III:

Billing: Measurement of work for payment of contractors and suppliers. Type of Measurement book, Maintenance of measurement book. Types of payments: First, running, advance, first & final and final payment.

[T1, T2][No. of Hrs: 11]

UNIT-IV

Valuation: Purpose of valuation, principles of valuation, Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc. Methods of valuation (i) replacement cost method (ii) rental return method .

[T1, T2][No. of Hrs: 12]

INSTRUCTIONAL STRATEGY

This is an applied engineering subject. Teachers are expected to provide working drawings for various civil engineering works and students be asked to calculate the quantities of materials required for execution of such works. Teachers should conceptualize analysis of rates for different types of works along with valuation of property.

Text Book(s):

[T1] B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.

[T2] M .Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot

Reference Book(s):

[R1] D.S.R. [Delhi Schedule Rates] C.P.W.D

[R2] PWD Account Code

[R3] Samuelson and Nardhaus-Economics, Mc Graw Hill

[R4] 'Text book of Estimating and Costing' by G.S.Birdie

[R5] 'Civil Engineering Building Drawing' by Gurucharan Singh

SURVEYING I**Paper Code: ETVCT-506****Paper: Surveying-I**

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: The students should have basic knowledge of understanding of building components. To learn the basic concept of surveying, study and understand the types of surveying and its applications in Civil Engineering. To have exposure about chain surveying, compass surveying, leveling and plane tabling as required in field.

Learning outcomes: The students should be able to visualize the concepts of different types of surveying. To perform surveying work individually. Well versed with computations of traversing, plotting, adjustments as required. Well conversant with levelling operation and calculations. Able to perform surveying projects in the field. Helpful in performing survey work in the construction projects such as: detailed surveying, plotting of survey data, preparation of survey maps and setting out works.

UNIT-I

Introduction and concept of surveying, purpose and objective of surveying, classification of surveying, basic principles of surveying, measurements-linear and angular, units of measurements, Instruments used for taking these measurements. Chain surveying: Introduction, technical terminology (chaining, ranging, offsetting, leader, follower, different points, different lines, different sketches etc.) principle of chain surveying purpose of chain surveying, advantages and disadvantages. Instruments: - types, construction, working and tests & adjustments. Methodology: Field procedure & operations- chaining, ranging and offsetting in different cases; recording and plotting. Obstacles in chaining, ranging and both, solutions to obstacles. Errors in chain surveying and corrections, traversing by chain surveying- recording and plotting.

[T1, T2, T3][No. of Hrs: 11]**UNIT-II**

Compass surveying: Introduction and purpose of compass surveying, principle of compass surveying. Concept of meridian, types of meridians; concept of bearing, different types of bearing; systems of bearing; forward bearing and backward bearing, systems of bearing- WCB & QB. Magnetic dip and declination, isogonics, agonic and isoclinic lines; Local attraction- definition, causes, detection, elimination; Types of compass-construction, working. Use of prismatic compass: Setting and taking observations. Traversing by compass: - different types, field procedure, recording, plotting, checks, closing error and its adjustment; Errors in compass surveying. Numerical problems shall be solved on systems of bearing, declination, local attraction and traversing.

[T1, T2, T3][No. of Hrs: 11]**UNIT-III**

Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, datum, MSL, station, gradient, reduced level, bench marks, line of collimation, axis of the bubble tube, axis of the telescope, vertical axis, back sight, foresight, intermediate sight, change point etc. Types of levels and staves- Temporary adjustments and permanent adjustment of dumpy level.

Methods of computing reduced levels-Height of Instrument method and rise and fall method (Arithmetic checks, problem on reduction of levels). Types of leveling:- simple leveling, Differential leveling, Fly leveling, check leveling, profile leveling (Longitudinal-section & cross-section) and reciprocal leveling. Errors in leveling and permissible limits.

[T1, T2, T3][No. of Hrs: 11]**UNIT-IV**

Plane Table Surveying- Introduction and purpose of plane table surveying, principle of plane table surveying, study of plane table and its accessories used in plane table survey. Field operations/ procedure. **Methods of plane table surveying:** Radiation, Intersection, Traversing and Resection. Resection: - Concept of Two point and Three point problems (Concept only). Errors, precautions, advantages and disadvantages of plane table surveying.

[T1, T2, T3][No. of Hrs: 12]

Scheme and Syllabi for B. Voc. (Construction Technology), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

Text Book(s):

- [T1] N.N. Basak "Surveying and Leveling" Tata McGraw Hill Publications, New Delhi
[T2] Punmia, B.C.; "Surveying and Leveling", Delhi Standard Publishers Distributors.
[T3] Subramanian, R., "Fundamentals of Surveying and Leveling", Oxford University Press

References Books:

- [R1] K.R. Arora, Surveying Vol. I and II Standard Book House, New Delhi
[R2] Arthur Bannister, "Surveying", Pearson Education
[R3] Mimi Das Saikia, Madan Mohan Das, "Surveying", PHI Publications
[R4] S.K. Roy, "Fundamentals of Surveying", PHI Publications
[R5] T. P. Kanetkar and Kulkarni, "Surveying and Leveling", Standard Publishers
[R6] C. Venkatramaiah, "Textbook of Surveying", 2nd Edition, University Press.

ENVIRONMENTAL SCIENCE
(Common to all disciplines)

Paper Code: ETVEN-502
Paper: Environmental Science

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites:

The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment. This course must raise various questions in student's mind that how our environment is inter dependent on various factors and how human being must care for their natural surroundings.

UNIT I: Environmental Studies: Ecosystems, Bio-diversity and its Conservation

(i) The Multidisciplinary Nature of Environmental Studies

Definition, scope and importance of Environmental Studies, Biotic and a biotic component of environment, need for environmental awareness.

(ii) Ecosystems

Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and function of the following ecosystem:

- (a) Forest ecosystem
- (b) Grassland ecosystem
- (c) Desert ecosystem
- (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

(iii) Bio-diversity and its Conservation

Introduction to biodiversity - 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 mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : Habitat loss, Poaching of wildlife, man-wildlife conflicts, rare endangered and threatened species (RET) endemic species of India, method of biodiversity conservation: *In-situ* and *ex-situ* conservation.

[T1], [R3] [No. of Hrs. 11]

UNIT II: Natural Resources: problems and prospects

Renewable and Non-renewable Natural Resources; Concept and definition of Natural Resources and need for their management

- **Forest resources:** Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
- **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management.
- **Mineral resources:** Uses are exploitation, environmental effects of extracting and using mineral resources, case studies.
- **Food resources:** World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- **Energy resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies.
- **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

[T1], [R3] [No. of Hrs. 11]

UNIT III: Environmental Chemistry and Pollution Control**(i) Chemistry of Environment**

(a)**Green Technology:** Principles of Green technology, Zero Waste Technology, Green Chemistry & Its basic principles, Atom Economy, Green Methodologies, clean development mechanisms (CDM), concept of environmental impact assessment,

(b)**Eco-Friendly polymers:** Environmental degradation of polymers, Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydrobiodegradable, Biopolymers & Bioplastics: polylactic acid, polyhydroxybutyrate, polycaprolactone,. Concept of bioremediation.

(ii) Environmental Pollution

Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste.

Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.

[T1], [R3] [No. of Hrs. 11]

UNIT IV: Disaster Management, Social Issues, Human Population and the Environment**(i) Disaster Management**

Disaster management: floods, earthquake, cyclone and land-slides, nuclear accidents and holocaust, *case studies*.

(ii) Social Issues, Human Population and the Environment

Sustainable development, Climate change, global warming, acid rain, ozone layer depletion, Environmental ethics: Issues and possible solutions, Consumerism and waste products, Wasteland reclamation. Population growth, problems of urbanisation, Environment Protection Act, 1986; Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and Control of Pollution) Act, 1974; Wildlife Protection Act, 1972; Forest Conservation Act, 1980; Environmental management, system standards-ISO 14000 series.

[T1] [No. of Hrs. 12]

Text Books:

- [T1] E. Barucha, *Textbook of Environmental Studies for Undergraduate Courses*, Universities Press (India) Pvt. Ltd., 2005.
 [T2] S. Chawla, *A Textbook of Environmental Studies*, McGraw Hill Education Private Limited, 2012

References Books:

- [R1] G. T. Miller, *Environmental Science*, Thomas Learning, 2012
 [R2] W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003.
 [R3] R. Rajagopalan, *Environmental Studies: From Crisis to Cure*, 2nd Edition, Oxford University Press, 2011.
 [R4] A.K. De, *Environmental Chemistry*, New Age Int. Publ. 2012.,
 [R5] A. Kaushik and C.P. Kaushik, *Perspectives in Environment Studies*, 4th Edition, New Age International Publishers, 2013
 [R6] *Environmental Engineering* by Gerard Kiely, Tata McGraw-Hill Publishing Company Ltd. New Delhi, 2010.

CONSTRUCTION MATERIALS

Paper Code: ETVCT-508
Paper: Construction Materials

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives and Pre-requisites: To acquire proper knowledge about different construction materials and their applications. To have exposure about various construction materials as required in engineering. The students should learn the details of various construction materials such as stones, bricks and tiles, cement and cement based products, and lime, timber and wood based products, paint and varnishes metals and other miscellaneous materials and their applications.

Learning outcomes: Helps in making him as a better super visor at construction sites/ industries. Improved ability to identify and visualize various construction materials that are being used in construction and other industries. Enhanced knowledge of construction materials helps students in pursuing their careers in material testing field. This subject helps in understanding the various subjects related to different vocational courses in later stages.

UNIT-I:

Building Stones: Classification of Rocks, Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification: Calcareous, argillaceous and siliceous rocks. Physical classification: Un-stratified, stratified and foliated rocks; Requirements of good building stones, testing & identification of common building stones and their uses. Bricks and Tiles: Introduction to bricks, Raw materials for brick manufacturing and properties of good brick making earth, Classification of bricks as per IS: 1077, Testing of common building bricks as per IS: 3495. Compressive strength, water absorption, efflorescence test, Dimensional tolerance test. Types and use of- tiles for wall, roofing & flooring; ceramic tiles; Hollow masonry blocks; Fly ash bricks.

[T1, T2][No. of Hrs: 11]**UNIT-II:**

Cement: Introduction, raw materials, manufacturing of ordinary Portland cement, flow diagram for wet and dry process. Properties and uses of ordinary Portland cement. Special cements and their uses. Storage of cement.
Lime:-Introduction: Lime as one of the cementing materials. Definition of terms; quick lime, fat lime, hydraulic lime, hydrated lime, lump lime. Calcinations and slaking of lime IS classification of lime. Definition- Properties and uses of Mortar. Types of mortar, cement & lime Mortar, Preparation of cement Mortar.

[T1, T2][No. of Hrs: 11]**UNIT III:**

Timber and wood based products. Identification of different types of timber: Teak, Deodar, Shisham, Sal, Mango. Market forms of converted timber as per IS. Seasoning of timber: purpose, methods of seasoning. Defects and decay in timber, Preservation of timber and methods of treatment, Properties and specifications of structural timber. Other wood based products, their brief description of manufacture and uses: Lamina board, Black board, fiber board. Hard board and gypsum board.

[T1, T2][No. of Hrs: 11]**UNIT IV:**

Purpose and use of paints, Types, ingredients, properties and uses of oil paints, water paints and Cement paints. Types, properties and uses of varnishes, Trade name of different products. Metals: - uses of ferrous and non-ferrous metals, Commercial forms of ferrous and non-ferrous metals. Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes. Types uses and application of- Fiber Sheets, insulating materials, Materials used in interior decoration works like POP, Water proofing compounds, fire resisting materials.

[T1, T2][No. of Hours: 12]**Text Book(s):**

- [T1] Surendra Singh; “Engineering Materials; “New Delhi”. Vikas Publishing House Pvt. Ltd.
 [T2] TTTI, Chandigarh “Civil Engineering Materials; “Tata McGraw Hill.

Scheme and Syllabi for B. Voc. (Construction Technology), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

Reference Book(s):

- [R1] M.L.Gambhir and Neha Jamwal, "Building Materials", Tata McGraw Hill.
[R2] Building Materials, P.C.Varghese, PHI Publications
[R3] Engineering materials S.C. Rangwala, Charotar Publishing House
[R4] Building Materials, Duggal, New Age Publication
[R5] Kulkarni, GJ; "Engineering Materials; "Ahmedabad, Ahmedabad Book Depot.



BASIC ELECTRONICS
(Open Elective-II)

Paper Code: ETVEC-506
Paper: Basic Electronics

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: Objective of the paper is to facilitate the student with the basics of electronic aspects that are required for his understanding and applications in their respective field of study. The pre-requisites are, to have a basic understanding of Applied Physics and Mathematics.

UNIT-I

Evaluation of Electronics: Introduction & Application Of Electronics, Energy Band Theory Of Crystals, Energy Band Structures In Metals, Semiconductors And Insulators, Theory Of Semiconductors: Classification Of Semiconductors, Conductivity Of Semiconductors, Carrier Concentration In Intrinsic & Extrinsic Semiconductors, Properties Of Intrinsic And Extrinsic Semiconductors, Variation In Semiconductors Parameters With Temperature, Fermi-Dirac Function, Fermi Level In A Semiconductor Having Impurities, Band Structure Of Open-Circuited P-N Junction, Drift And Diffusion Currents, Carrier Life Time, Continuity Equation (Elementary Treatment Only).

[T1][T2][T3][No. of Hours: 11]

UNIT – II

Theory of p-n Junction Diode: Diode Current Equation, Diode Resistance, Transition Capacitance, Diffusion Capacitance, (Elementary treatment only), Effect of Temperature on p-n Junction Diode, Switching Characteristics, Piecewise Linear Model,

Special Diodes: Zener Diode, Varactor Diode, Tunnel Diode, Photodiode, Light Emitting Diodes, Schottky Barrier Diode,

Applications of Diodes: Half-Wave Diode Rectifier, Full-Wave Rectifier, Clippers and Clampers (Elementary treatment only).

[T1][T2][T3][No. of Hours: 11]

Unit – III

Bipolar Junction Transistor: Introduction of transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations, Eber-moll's model.

[T1][T2][T3][No. of Hours: 11]

Unit – IV

Application of BJT: CB, CE, CC configurations, hybrid model for transistor at low frequencies, Introduction to FETs and MOSFETs.

Fundamentals of Digital Electronics: Digital and analog signals, number systems, Boolean algebra, logic gates with simple applications, logic gates, karnaugh maps.

[T1][T2][T3][No. of Hours: 12]

Text Book(s):

- [T1] S. Salivahanan, N. Suresh Kr. & A. Vallavaraj, "Electronic Devices & Circuit", Tata McGraw Hill, 2008
- [T2] Millman, Halkias and Jit, "Electronic Devices and Circuits" McGraw Hill
- [T3] Boylestad & Nashelsky, "Electronic Devices & Circuits", Pearson Education, 10th Edition.

Reference Book(s):

- [R1] Sedra & Smith, "Micro Electronic Circuits" Oxford University Press, VIth Edition
- [R2] Robert T. Paynter, "Introducing Electronic Devices & Circuits", Pearson Education, VIIth Edition, 2006

CONSTRUCTION MATERIALS LAB**Paper Code: ETVCT-558**

L	T/P	C
0	2	2

Paper: Construction Materials Lab

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

- 1) To determine the crushing strength of bricks
- 2) To determine the water absorption of bricks.
- 3) To conduct field tests on cement.
- 4) To determine fineness (by sieve method) of cement.
- 5) To determine normal consistency of cement.
- 6) To determine initial and final setting times of cement.
- 7) To determine soundness of cement.
- 8) To determine compressive strength of cement.
- 9) Field visit to study different types of cements/ bricks/ timber/ plastic materials/ tiles/ paints/ new & advanced material that are used in construction industry

Teachers are expected to physically show various materials while imparting instructions. Field visits should be organized and active participation of students shall be encouraged.

BASIC ELECTRONICS LAB

Paper Code: ETVEC-556
Paper: Basic Electronics Lab

L	T/P	C
0	2	2

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

1. Introduction to C.R.O, Function Generator & Bread Board Kit & to generate different types of waveform with the help of Function Generator & to calculate their frequency, amplitude AC & DC voltage.
2. Identification & testing of Active & passive components
3. To plot V-I characteristics of a semiconductor diode & Calculate Static & Dynamic Resistance
4. To Study the Reverse characteristics of Zener diode
5. To Study the Rectifier circuit.
 - a) Half Wave Rectifier
 - b) Centre Tapped Rectifier.
 - c) Bridge Rectifier.
6. To Study the output waveforms of different Filter Ckts of Rectifier.
7. To Plot Input & Output characteristics CB transistor.
8. To Plot Input & Output characteristics of CE transistor.
9. Realization of basic gates.
10. Implementation of Boolean functions (two or three variables).
11. Few experiments mentioned above to be performed on P-spice.
12. To develop a working model of any electronic circuit.

CIVIL ENGINEERING DRAWING LAB

Paper Code: ETVCT-552

Paper: Civil Engineering Drawing Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

Objectives and Pre-requisites: Drawing is the language of engineers and technicians. To Read and interpret engineering drawing as required in their day-to-day responsibility. The pre requisite knowledge on building components and construction is necessary. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.

Learning outcomes: Able to draw the plan of different components and fixtures of buildings. Capable of preparing plans, sections and elevations of different engineering units as per requirements. Improves the ability to think and work in accordance with the client/ project requirements and needs. This subject helps in better understanding of the concepts of CAD in later stages of the course.

DETAILED CONTENTS

1. A) Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections B) Elevation, sectional plan and sectional side elevation of flush door & glazed door C) Elevation, section plan and sectional side elevation of paneled window and glazed window
2. Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.
3. Plans of 'T' and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond
4. A) Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- King post truss B) Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- queen post truss
5. A) Drawing plan and section of a dog legged stair (excluding reinforcement details) B) Drawing plan, elevation of a small building by measurement.
6. Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet
7. Drawing of a small single storey building showing position of sanitary fittings house drainage and electrical fittings
8. Drawing of floors (concrete flooring, ceramic/vitrified tile flooring)
9. Drawing details of damp proofing arrangement of roofs, basement floors and walls as per BIS Code
10. Drawing the plan and elevation of an office building
11. Drawing the plan and elevation of primary health care centre
12. Drawing the plan and elevation of post office

ESTIMATING & COSTING II LAB**Paper Code: ETVCT-554****L T/P C****Paper: Estimating & Costing Lab****0 2 2**

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

1. Collection different types of documents required for tendering
2. Study of different types of tenders from newspapers and other sources
3. Computation of standard rent for a property (valuation)
4. Study of contract documents
5. Preparation of contract document (e.g. construction of compound wall at ABIT)
6. Prepare a tender notice for newspaper for construction of New class room building in your institute
7. Study of e- tendering
8. Prepare a e-tender for procuring lab instruments.

SURVEYING I**Paper Code: ETVCT-556****Paper: Surveying-I**

L	T/P	C
0	4	4

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. A) To study linear measurement instruments B) Chaining, ranging and off-setting of a survey line
2. A) To find out the area using offset-survey
3. Traversing using chain surveying
4. A) To study prismatic compass B) To measure the angles between the intersecting lines using compass
5. Traversing using chain and compass survey (recording, plotting and adjusting closing error)
6. A) To study dumpy level and leveling staves B) To find out the reduced levels of different stations using Height of Instrument (HI) method.
7. A) To find out the reduced levels of different stations using rise and fall method.
8. To carry out leveling of a small area
9. A) To study plane table and its accessories B) To find out the distance between different points using Radiation method
10. To find out the distance between different points using Intersection
11. To conduct plane table traversing
12. To set out a building plan

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying; stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students. Technical visit to Survey of India, Northern Region and Great Trigonometrical Survey (GTS), Dehradun may be considered and explored.

ENVIRONMENTAL SCIENCE LAB/ FIELD WORK
(Common to All Disciplines)

Paper Code: ETVEN-552

Paper: Environmental Science Lab/ Field Work

L	T/P	C
0	2	2

List of Experiments

1. Determination of pH, conductivity and turbidity in drinking water sample.
2. Determination of pH and conductivity of soil/sludge samples.
3. Determination of moisture content of soil sample.
4. Determination of Total Dissolved Solids (TDS) of water sample.
5. Determination of dissolved oxygen (DO) in the water sample.
6. Determination of Biological oxygen demand (BOD) in the water sample.
7. Determination of Chemical oxygen demand (COD) in the water sample.
8. Determination of Residual Chlorine in the water sample.
9. Determination of ammonia in the water sample.
10. Determination of carbon dioxide in the water sample.
11. Determination of nitrate ions or sulphate ions in water using spectrophotometer.
12. Determination of the molecular weight of polystyrene sample using viscometer method.
13. Base catalyzed aldol condensation by Green Methodology.
14. Acetylation of primary amines using eco-friendly method.
15. To determine the concentration of particulate matter in the ambient air using High Volume Sampler.

P.S.: For better understanding of various aspects of environment visits to local areas, depending upon easy access and importance may be planned to any nearby river, forest, grassland, hills and students should write a report based on their observations.

Suggested Books:

- [T1] [A. I. Vogel, G. H. Jeffery](#), *Vogel's Text Book of Quantitative Chemical Analysis*, Published by Longman Scientific & Technical, 5th Edition, 1989.
- [T2] dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments).
- [T3] S. Chawla, *Essentials of Experimental Engineering Chemistry*, Dhanpat Rai & Co., 3rd Edition, 2008.
- [T4] S. Rattan, *Experiments in Applied Chemistry*, Published by S.K.Kataria & Sons, 2nd Edition, 2003.
- [T5] W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003.
- [T6] A. Kaushik and C. P. Kaushik, *Perspectives in Environment Studies*, 4th Edition, New Age International Publishers, 2013.

PROJECT-I**Paper Code: ETVCT-562****L T/P C****Paper: Project:****0 6 3**

Objectives: *The practical training cum project work is intended to place students for project oriented practical training in actual work situations for the stipulated period with a view to:*

- a) Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- b) Develop understanding of subject based knowledge given in the class room in the context of its application at work places
- c) Develop first-hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems in the world of work.
- d) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

This practical training cum project work should not be considered as merely conventional industrial training in which students are sent at work places with minimal supervision. This experience is required to be planned and supervised on regular basis by the faculty. For the fulfilment of above objectives, Institute may establish close linkage with relevant organizations for providing such an experience. It is necessary that each organization is visited well in advance and activities to be performed by student are well defined. The chosen activities should be such which are of curricular interest to students and of professional value to industrial/field organizations. Project selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them. Project Lab has to be developed and nurtured. Various testing equipments such as non-destructive testing equipments, water analysis testing equipments etc., may be procured for enhancing project lab.