



# **ITM UNIVERSITY**

## **Naya Raipur, Raipur**

**B.Tech (Bachelor of Technology)**



**Second Year Engineering Syllabus**  
**Third Semester**

**Department of Civil Engineering**  
**2017**

**Civil Engineering Branch**  
**B. Tech Third Semester Syllabus**  
**Teaching and Examination Scheme**

Subject Code	Subject Name	Teaching Scheme		Examination Scheme				
		Th.+Tut (L+T)	Pr. (P)	Theory Marks		Term Work (Internal)	Practical (External)	Total
				End Sem. Exam	Internal Assessment			
301301	Applied Mathematics - III	06	-	70	30	-	-	100
301302	Object Oriented Programming through C++	05	-	70	30	-	-	100
301303	Fluid Mechanics	04	-	70	30	-	-	100
301304	Engineering Geology	04	-	70	30	-	-	100
301305	Surveying - I	04	-	70	30	-	-	100
301306	Building Construction and Materials	04	-	70	30	-	-	100
301307	Object Oriented through Programming C++ Lab.	-	-	-	-	15	35	50
301308	Fluid Mechanics Lab.	-	02	-	-	15	35	50
301309	Engineering Geology Lab.	-	02	-	-	15	35	50
301310	Surveying - I Lab.	-	02	-	-	15	35	50
301311	Report Writing	-	02	-	-	15	35	50
301312	Project-I	-	04	-	-	50	100	150
		27	14	420	180	125	275	1000

Subject Code: 301301  
Lectures: 6 Hrs/Week



Subject Name: Applied Mathematics – III  
Theory Exam Duration: 3 Hrs

### Detailed Syllabus

Topics
<b>Unit-I : Fourier Series &amp; Fourier Transform:</b> Periodic Functions, Fourier series for function with period, Dirichlet's conditions, Fourier series for functions having finite discontinuities, Change of Interval, Fourier series for Even and odd functions, Half range Fourier series, Harmonic Analysis. Fourier transform, Fourier Integral (complex form), Fourier Sine and Cosine transforms, Properties, Convolution theorem, Parseval's identity
<b>Unit-II : Laplace Transform:</b> Definition, conditions for Laplace Transform, Transform of general functions ( $e^{at}$ , $t^n$ , $\sin at$ , $\cos at$ , $\sinh at$ , $\cosh at$ ), Shifting theorem, Laplace transform of derivative and integral of a function, differentiation and integration of transform (Multiplication and division by $t$ ). Inverse Laplace transform – Methods of finding inverse Laplace transform, Convolution theorem (without proof). Application – Application in finding value of integrals, Solution of Differential equations (LDE & Simultaneous linear equations), Laplace transform of some special functions (Unit step function, Unit Impulse function, Periodic function)
<b>Unit-III : Z – Transform :</b> Sequence, Basic operations on sequences, Definition of Z- Transform, Linearity, Change of scale & shifting properties, Z- transform of standard sequences, Inverse Z Transform, Multiplication by $n$ & division by $n$ , Initial value & final value theorems, Convolution of sequences, Convolution theorem, Inverse Z- transform by partial fraction, power series and residue methods. Application to solution of difference equations
<b>Unit-IV : Random Variable :</b> Random variable, Probability distributions (Discrete and Continuous), Constants of Probability distributions (Expectation, variance, moment and Mean deviation from mean), Repeated Trials, Binomial Distribution & properties Poisson distribution, Poisson's Distribution as limiting case of Binomial Distribution, Normal Distribution, Properties, calculation of probability using Normal curve and chart.. sampling techniques (Probabilistic and non- Probabilistic), Sampling distributions, Error in Sampling : Chi- Square, $t$ , $z$ and $F$ tests
<b>Unit-V: Calculus Complex Functions:</b> Analytic functions, Cauchy – Riemann Equations, Harmonic Functions and Orthogonal systems. Construction of analytic functions and flow problems. Integration of complex functions, Cauchy's Integral theorem (without proof), Cauchy's Integral formula – Extension and generalizations (without proof) Series expansion of Complex functions – Taylor's and Laurent's series Zeros and Singularities of an analytic function, Residue at pole, calculation of residues. Evaluation of real integrals using calculus of residues.

#### Recommended Books:

1. Higher Engineering Mathematics – B. S. Grewal (42<sup>nd</sup> – Edition) – Khanna Publishers .
2. Advanced Engineering Mathematics – E. Kryzig (9<sup>th</sup> – Edition) – John Willy Publication.
3. Engineering Mathematics – III – H. K. Pathak – Shiksha Sahitya Prakashan.
4. Engineering Mathematics – H. K. Dass – S. Chand Publication.
5. Advanced Engineering Mathematics - Jain / Iynger – Narosa Publication.

Subject Code: 301302  
Lectures: 5 Hrs/Week



Object Oriented Programming through C++  
Theory Exam Duration: 3 Hrs

### Detailed Syllabus

Topics
<b>Unit I: Introduction to object oriented programming</b> , user defined types, polymorphism, and encapsulation. Getting started with C++ -syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.
<b>Unit II: Abstraction mechanisms:</b> Classes, private, public, constructors, member functions, static members, references etc. Class hierarchy, derived classes.
<b>Unit III: Inheritance:</b> simple inheritance, polymorphism, object slicing, base initialization, virtual functions. Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc.
<b>Unit IV: Memory management:</b> new, delete, object copying, copy constructors, assignment operator, this Input/output. Exception handling: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.
<b>Unit V: Templates and Standard Template library:</b> template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type Design using C++ design and development, design and programming, role of classes.

#### Recommended Books:

1. Bhav&Patekar- Object oriented Programming with C++, Pearson Education
2. Ashok N. Kamthane- Object oriented Programming with ANSI & Turbo C++, Pearson Education.
3. Robert Lafore- Object oriented programming in Microsoft C++.
4. BalaguruSwamy-C++, TMH publication

Subject Code: 301303  
Lectures: 4 Hrs/Week



Subject Name: Fluid Mechanics  
Theory Exam Duration: 3 Hrs

### Detailed Syllabus

Topics
<b>UNIT – I : Introduction:</b> Fluid and continuum, physical properties of fluids ideal and real fluid, Newtonian and Non-Newtonian Fluid. <b>Fluid Statics:</b> Pressure density height relationship, pressure measurement by Manometers, Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, meta-centric height, fluid mass subjected to uniform accelerations.
<b>UNIT – II : Fundamentals of Fluid Flow – I:</b> Kinematics of Flow: Kinematics of fluid flow: Steady and unsteady flow, uniform and non uniform flow, laminar and turbulent flow, one, two and three dimensional flow, streamlines, streak lines and path lines, circulation and vorticity, rotational and irrotational flow, velocity potential and stream function, graphical and experimental methods of drawing flow nets, continuity equation.
<b>UNIT – III: Fundamental of Fluid Flow - II: Kinetic of Flow:</b> Pores influencing motion, Eulers equations of motion, Navier – stokes, Reynolds Equation. Bernoulli's equation, Assumptions, derivation, limitation and application, Kinetic energy correction factor. Momentum equation, impact of jets, force plates pipe bends and closed conduits, momentum Venturimeter, orifice meter and flow nozzles. <b>Fluid Measurement - I:</b> Velocity measurement: Pitot tube, pitot – static tube and Prandtl tube. Discharge measurement, venturimeter, orifice meter and flow nozzles.
<b>UNIT – IV Fluid Measurement-II :</b> Orifice and mouthpieces, orifice: definition types, hydraulic coefficient factors affecting them and their experimental determination. Large orifice and submerged orifices, time for emptying tank by orifice mouth piece: definition and utility, external and mouth piece, running free and running full pressure at vena contracta, coefficient of discharge. Flow measurement and control <b>Notches and weirs:</b> Definition, types, rectangular, triangular and trapezoidal, end contraction coefficient of discharge and its determination. Error in measurement in head. Velocity of approach and its effects, Cippoletti, Broad crested and submerged weirs.
<b>UNIT – V Dimensional analysis and theory of models:</b> Dimensional analysis: Definition and use, fundamentals and derived dimensions, dimension analysis by Raleigh and Bunckinham's PI methods. Similitude geometric, kinematic and dynamic similarities. Predominant force, force ration, dimensionless numbers and their significance.

#### Recommended Books:

1. Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw-Hill, 1983.
2. Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi (7th edition), 1995.
3. Vasandani, V.P., "Hydraulic Machines - Theory and Design", Khanna Publishers, 1992.
4. Bansal, R.K., "Fluid Mechanics and Hydraulics Machines", (5th edition), Laxmi publications (P) Ltd., New Delhi, 1995.
5. White, F.M., "Fluid Mechanics", Tata McGraw-Hill, 5th Edition, New Delhi, 2003.
6. Ramamurtham, S., "Fluid Mechanics and Hydraulics and Fluid Machines", Dhanpat Rai.



**Subject Code: 301304**  
**Lectures: 4 Hrs/Week**

**Subject Name: Engineering Geology**  
**Theory Exam Duration: 3 Hrs**

### **Detailed Syllabus**

<b>Topic</b>
<b>UNIT-I General Geology:</b> Definition and scopes of geology, Introduction to continental draft and plate tectonics, Principles of stratigraphy & the geologic time scale, <b>Geomorphology:</b> Geomorphology processes, Geological action of Wind, glaciers, running water and oceans and the resulting landforms, geomorphic forms and their consideration in engineering structures.
<b>UNIT –II Mineralogy</b> Definition of Minerals, their physical properties, optical properties and chemical properties. The detailed study of certain rock forming minerals with respect to the physical properties. General chemical and physical characters of the following mineral groups, Silica, Feldspar, olivine, Pyroxene, Amphibole, Mica, and clay.
<b>UNIT –III Rocks and Rock deformation</b> Their origin, structure, texture, classification of rocks in brief and their suitability as Engineering materials, and relation to engineering behavior masses. dip and strike of bed, Folds, Faults, joints, unconformity and their classification, causes Weathering, Soils, soil profile and soil types, rock.
<b>UNIT –IV Engineering Geology:</b> Application of geology to Civil Engineering projects engineering properties of Rocks. Engineering Geological Sites Selection Engineering Geological considerations for site selection of Dams and Reservoirs, Tunnels, Bridges and Highways, Geological Maps, concept of geological maps, important terminology used for map and making a section from the map.
<b>UNIT -V Earthquake:</b> Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, reservoir related, earthquake problem and its preventive measures, distribution of seismic zones in India.

### **Recommended Books:**

1. A Textbook of Geology – Mukherjee P.K. (World Press Publishers)
2. Physical and Engineering Geology – S.K. Garg
3. Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)
4. A Geology for Engineers – Blyth, F.G.M. (Arnold, London)
5. Civil Engineering Geology – Cyril Sankey Fox (C. Lockwood and son, U.K.)
6. Engineering and General Geology – Prabin Singh (Katson Publication House)

**Subject Code: 301305**  
**Lectures: 4 Hrs/Week**

**Subject Name: Surveying - I**  
**Theory Exam Duration: 3 Hrs**

**Detailed Syllabus**

<b>Topics</b>
<b>Unit 1: Leveling:</b> Different methods of determining elevations: Spirit, Trigonometric, Barometric and Photogrammetric methods, Spirit leveling-Definitions of terms, Principle, Construction, Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Automatic levels, Levelling staves, Methods of spirit leveling Booking and reduction of field notes, Curvature and refraction, Reciprocal leveling Plotting of profiles, Barometric leveling, Construction and field use of altimeter, Trigonometric leveling- simple and reciprocal observations, Source of errors and precision of leveling procedures.
<b>Unit 2: Contouring:</b> Direct and Indirect methods of contouring. Interpolation of contours, Drawing section from contour map, Application and Modern methods of depicting relief on a Map.
<b>Unit 3 : Theodolite and Traversing :</b> Venire and microptic theodolites, Temporary and permanent adjustments, Requirements of nonadjustable parts, Measure of horizontal and vertical angles by different methods Principle of traversing by theodolite, Field work and checks, Computation of coordinates, Source of errors, Precision of traversing, Checking and adjusting of traverses, Omitted measurements
<b>Unit 4: Plane Table Surveys:</b> Principles, Advantages and disadvantages, Plane table equipment, Use of Telescopic Alidade and Indian Pattern tangent Clinometer, Different methods of Plane Table Surveying, Resection-Two and Three point problems. Fields work in Plane Table Surveying and contouring. Minor Instruments Hand level, Abney Level, clinometers, ceylonghat tracer, Box Secant, Pentagraph, planimeter, ediograph.
<b>Unit 5: Curves:</b> Classification of curves; Elements of Circular, Transition and Vertical curves, Theory and method of setting out Simple, Transition and Vertical curves. Special field problems.

**Recommended Books:**

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. I & II) – Kanetkar (Pune VidyarthiGrihaPrakashan, Pune)
3. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
4. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
5. Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
6. Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)
7. Surveying and Levelling – N. N. Basak



**Subject Code: 301306**  
**Lectures : 4 Hrs/week**

**Subject Name: Building Construction and Materials**  
**Theory Exam Duration : 3 Hrs**  
**Detailed Syllabus**

Topics
<b>UNIT – I Foundations</b> Necessity and types of foundation , Details shallow foundations. Bearing capacity of soils and its assessment . Preumptive bearing capacity values from coads. Loads on foundation ,Causes of failures of foundation and remedial measures, Foundation on black cotton soils Setting out foundation trenches, excavation timbering of foundation trenches. Load bearing and framed structures.
<b>UNIT- II Brickwork</b> Qualities of good bricks, classification of bricks tests on bricks as per as codes. Terms used in brickwork , commonly used types of bonds in brickwork such as header, stretcher, english andflamish bonds, principles of construction. Reinforced brickwork , brick knogging. Parapets, coping, sills and corbels, brief introduction to cavity walls , load bearing and partition walls. <b>Masonry:</b> Masonry construction using cement concrete blocks and clay walls, load bearing and partition walls. Masonry construction using cement concrete blocks and clay blocks. Precast construction : introduction to method and materials . precast elements likes poles, cover, jallies, steps corbets, truss elements etc.
<b>UNIT – III Stone Work</b> Stone , cutting and dressing , selection of stones types of stone masonry, principles of construction joints in masonry . Lifting heavy stones, common building stones in India. Arches and Lintels : Terminology in contraction , types chajjas and canopies, pre cast Lintels & Arches. <b>Doors and Windows :</b> Purpose materials of construction and types, <b>Damp Proofing :</b> Causes and effect of dampness . Various methods of damp proofing Damp proofing in plinth protection, New Techniques of Damp proofing Damp Proofing in Plinth Protection, New Techniques of damp proofing ,Epoxy etc.
<b>UNIT – IV Floors And Roofs : Floors :</b> General principle , types and method of construction upper floorsfinisheem quality and floor tiles, synthetic & Creamic Tiles. <b>Roofs :</b> Flat and pitches roofs, roof covering, types AND their construction features .Thermal Insulation.
<b>UNIT – V Stairs :</b> Types of stairs , functional design of stairs. <b>Painting :</b> White washing , colour washing and distempering new materials & Techniques.

**Recommended Books:**

1. Building Construction – B.C. Punmia (Laxmi Publication Pvt. Ltd.)
2. Building Construction – Sushil Kumar (Standard Publication Distributors)
3. Building Construction – S. C. Rangwala (Charotar Publishing House, Anand, Gujarat)
4. Building Construction – Gurucharan Singh (Standard Publication Distributors)
5. Engineering Materials – Surendra Singh (Laxmi Publication)
6. Construction Engineering and Management – S. Seetharaman (UmeshPublication)
7. Building Materials – Gurucharan Singh (Standard Publishers, Delhi)



### **Detailed Syllabus**

**Term work:** Term work shall consist of record of the experiments put of the following:

1. Programs on concept of classes and objects.
2. Programs using inheritance.
3. Programs using polymorphism.
4. Programs on use of operator overloading.
5. Programs on use of memory management.
6. Programs on exception handling and use of templates.
7. Programs on File handling in C++.
8. Design problem on stock and accounting of a small organization, railway reservation, payroll preparation and optimization problem.

More experiments must be there with reference to the contents of subject code 301302

**Subject Code: 301308**

**Practicals: 2 Hrs/week**

### **Detailed Syllabus**

**Term work:** Term work shall consist of record of the experiments out of the following;

(Minimum Eight practical to be performed)

#### **LIST OF EXPERIMENTS**

1. Determination meta-centric height of a ship model.
2. Verification of Bernoulli's theorem
3. Velocity measurement by Pitot tube, pitot static tube
4. Discharge measurement by venturimeter- determination of meter coefficient
5. To find the value of coefficient of discharge for a given orifice meter.
6. Study of status of flow using Reynolds Apparatus.
7. Flow over a rectangular notch: Determination of  $C_d$ ,  $C_v$  and  $C_c$
8. Flow over a triangular notch: Determination of  $C_d$ ,  $C_v$  and  $C_c$
9. Flow over a trapezoidal notch: Determination of  $C_d$ ,  $C_v$  and  $C_c$
10. Determination of hydraulic coefficient of a sharp edged circular orifice
11. Determination  $C_d$ ,  $C_v$  and  $C_c$  of an external cylindrical mouth piece
12. Calculation of the rate of flow using Rota meter.

Any other experiments with reference to the contents of subject code 301303.

**Subject Code: 301309**  
**Practical: 2 Hrs/week**

**Subject Name: Engineering Geology Lab.**

### **Detailed Syllabus**

**Term work:** Term work shall consist of record minimum ten experiments out of the following;

#### **List of Experiments:**

1. Magasopic study of the following Igeous Rocks : Granite, diorite, syenite, gabbro, dunite ,pagmiatite, rhyolite, andesite, basalt, pumics, obsidian.
2. Magasopic study of the following Sedimentary Rocks: Conglomerate, Breccia, grit, arkose, sandstone, greywacks, Lime stone.
3. Magasopic study of the following Metamorphic Rocks: slate, phylite, Schist, Gneiss, hornblende schist, Amphibolite marble, quartzite.

#### **Lectures: 2 Hrs/Week**

4. Megasopic study of following minerals:Talc, gypsum, calcite, fluorite, apatite.
5. Megasopic study of following minerals :feldspar, quartz, topaz, corundum.
6. Megasopic study of following minerals : hornblende, garnet, tourmaline, asbestos, olivine.
7. Megasopic study of following minerals : serpentine, muscovite, biotite, amethyst .
8. Geological map reading: strike, dip, outcrop, Construction or cross section of simple geological maps depicting structures like Unconfirmity, intrusives, folds, faults etc. and some maps with engineering problems .
9. Study of structural models of folds, faults, unconformity.
10. Use of clinometer – compass in geological mapping.
11. Local geological fieldwork to identify and interprete geomorphic and geological features.
12. Visits to site of engineering structures to study the bearing of geological features in them.

***Excursion be conducted under the guidance and supervision of the teaching staff and preliminary report on geological excursion shall be submitted by the students.***

Any other experiments with reference to the contents of subject code 301304.

**Subject Code: 301310**  
**Practical: 2 Hrs/Week**

**Subject Name: Surveying -I Lab.**

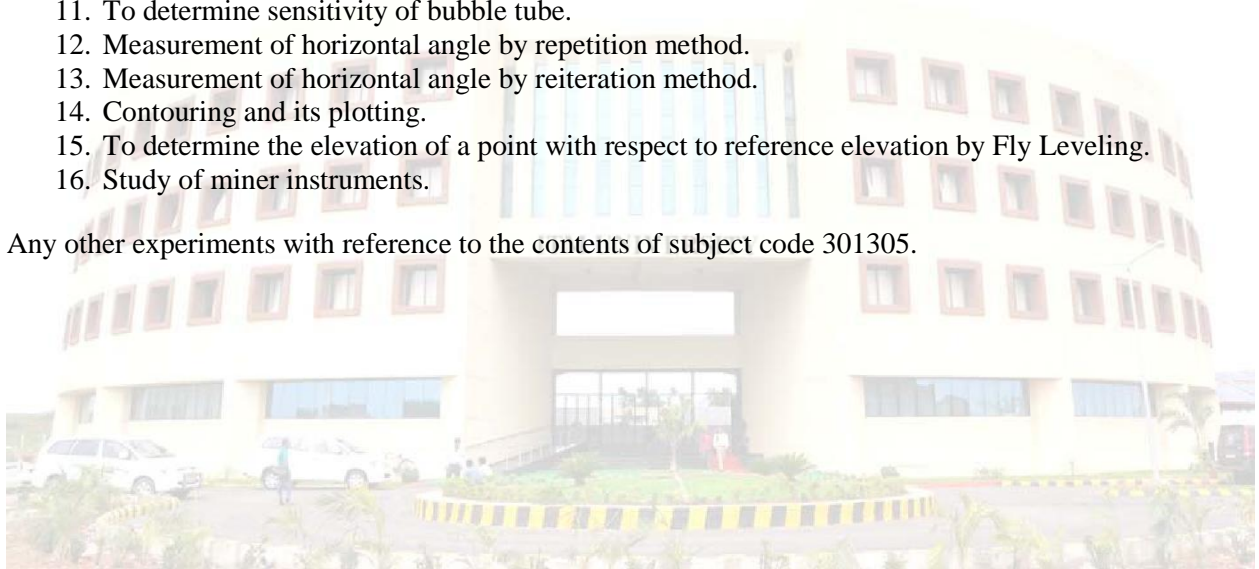
### **Detailed Syllabus**

**Term work:** Term work shall consist of record minimum ten experiments out of the following;

#### **List of Experiments:**

1. Determination of location of a point with the help of Two point problem.
2. Determination of location of a point with the help of Three point problem.
3. Setting out of curve by ordinates or offsets from long chord.
4. Setting out of curve by successive bisection of arcs.
5. Setting out of curve by offsets from chords produced (Or by deflection distances).
6. Setting out of curve by two theodolite method.
7. To find out the position of points by the Intersection method.
8. To determine the height of object when base is accessible.
9. To determine the height of tower when base is inaccessible and instrument stations are in same vertical plane.
10. To determine height of tower when base is inaccessible and instrument stations are in different plane.
11. To determine sensitivity of bubble tube.
12. Measurement of horizontal angle by repetition method.
13. Measurement of horizontal angle by reiteration method.
14. Contouring and its plotting.
15. To determine the elevation of a point with respect to reference elevation by Fly Leveling.
16. Study of minor instruments.

Any other experiments with reference to the contents of subject code 301305.



**Subject Code: 301311**

**Subject Name: Report Writing**

**Practical: 2 Hrs/week**

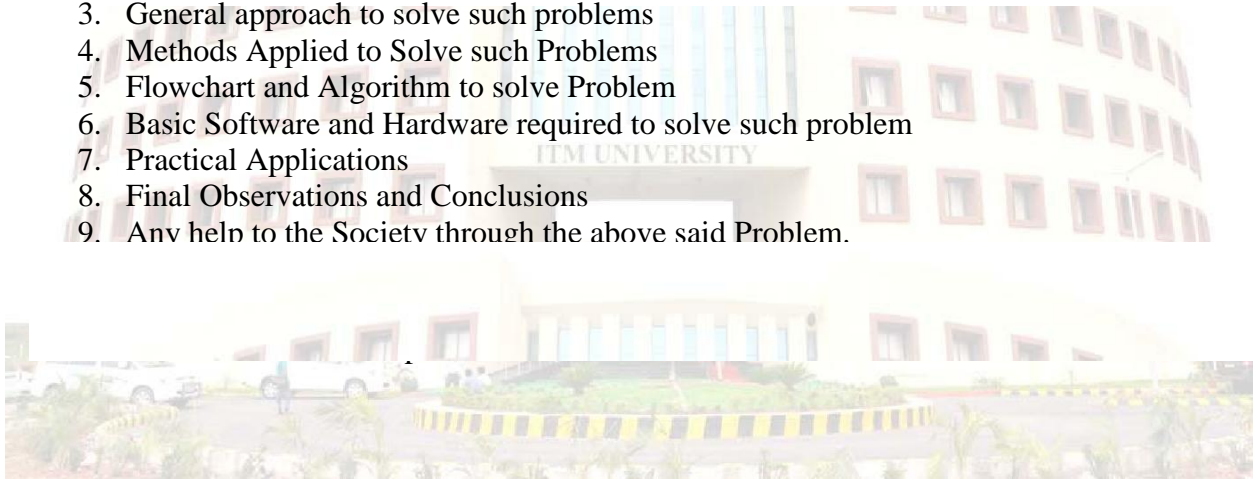
**Lectures: 2 Hrs/week**

### **Detailed Syllabus**

**Term work:** Term work shall consist of record of atleast TWO CASE Based Studies.

The record must contain the following:-

1. Well-defined Case – based Problem
2. Motivation to select such problem
3. General approach to solve such problems
4. Methods Applied to Solve such Problems
5. Flowchart and Algorithm to solve Problem
6. Basic Software and Hardware required to solve such problem
7. Practical Applications
8. Final Observations and Conclusions
9. Any help to the Society through the above said Problem.



**Subject Code: 301312**

**Subject Name: Project - I**

**Practical : 4 Hrs/week**

### **Detailed Syllabus**

**Term work:** Term work shall consist of report / thesis submitted based on the topic of one good Engineering / Research based problem.

1. **Formation of team, selection of topic :** Presentation on different project topics, Team formation including students and guide, Literature review in Library and internet on different project topics, Selection of Project topic and objectives
2. **Site Visits (If required):** Before undertaking the project design, team should visit sites where the project is already implemented and get acquainted with different perspectives. They should meet experienced personalities in the area and take their advice.
3. **Preliminary Design: After** selection of topic, the team should carry out further literature review and then come out with the preliminary design of the project in the form of drawing and explanation.
4. **Semester Project Progress Report:** A semester project progress report should be prepared comprising the work done as said above. The report should be presented before the Department faculty and subject experts.

The Report / Thesis must contain the following:-

1. Well-defined Case – based Problem
2. Motivation to select such problem
3. General approach to solve such problems
4. Methods Applied to Solve such Problems
5. Flowchart and Algorithm to solve Problem
6. Basic Software and Hardware required to solve such problem
7. Practical Applications
8. Final Observations and Conclusions
9. Any help to the Society through the above said Problem.

Please Note:- Based on the above work a power point presentation must be given by the candidate and defended with positive attitude. The candidate will be appreciated if he / she present his / her work in a Conference or publish his / her work in a reputed Journal.