SYLLABUS

For B.E CIVIL III & IV Semester
[2014-15]
### III SEMESTER

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
<th>Hours Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Lecture</td>
</tr>
<tr>
<td>1</td>
<td>UMA301C</td>
<td>Engineering mathematics -III</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td>UCV324C</td>
<td>Mechanics of materials</td>
<td>04</td>
<td>03</td>
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<td>3</td>
<td>UCV311C</td>
<td>Materials of construction</td>
<td>04</td>
<td>03</td>
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<tr>
<td>4</td>
<td>UCV312C</td>
<td>Engineering Geology</td>
<td>03</td>
<td>03</td>
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<tr>
<td>5</td>
<td>UCV313C</td>
<td>Surveying-I</td>
<td>04</td>
<td>04</td>
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<tr>
<td>6</td>
<td>UCV314C</td>
<td>Building Planning and Drawing</td>
<td>03</td>
<td>02</td>
</tr>
<tr>
<td>7</td>
<td>UCV315L</td>
<td>Surveying Practice-I</td>
<td>01</td>
<td>00</td>
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<td>8</td>
<td>UCV316L</td>
<td>Basic material testing Lab</td>
<td>01</td>
<td>00</td>
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<tr>
<td>9</td>
<td>UBT133M</td>
<td>Environmental studies*</td>
<td></td>
<td>02</td>
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<td>Total</td>
<td>24</td>
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### IV SEMESTER

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<tr>
<td>1</td>
<td>UMA401C</td>
<td>Engineering mathematics -IV</td>
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<tr>
<td>2</td>
<td>UCV402C</td>
<td>Structural Analysis -I</td>
<td>04</td>
<td>03</td>
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<td>3</td>
<td>UCV405C</td>
<td>Highway Engineering</td>
<td>04</td>
<td>03</td>
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<td>4</td>
<td>UCV411C</td>
<td>Fluid Mechanics</td>
<td>03</td>
<td>04</td>
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<td>5</td>
<td>UCV412C</td>
<td>Construction Technology</td>
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<td>6</td>
<td>UCV413C</td>
<td>Surveying - II</td>
<td>04</td>
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<td>7</td>
<td>UCV408L</td>
<td>Engineering Geology Lab</td>
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<td>8</td>
<td>UCV414L</td>
<td>Concrete testing Lab</td>
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<td>9</td>
<td>UCV415L</td>
<td>Surveying Practice - II</td>
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<td>10</td>
<td>UMA001M*</td>
<td>Advanced Mathematics -I</td>
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<td>11</td>
<td>UHS226M**</td>
<td>Constitution of India</td>
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<td>Total</td>
<td>26</td>
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</table>
III SEMESTER
UMA301C ENGINEERING MATHEMATICS – III
04 Credits (4-0-0)

Unit-I

NUMERICAL ANALYSIS:
Roots of Transcendental equations using Bisection Method, Regula-Falsi Method and Newton-Raphson Method. Finite differences, forward, backward and central difference operators (no derivations on relations between operators), Newton-Gregory forward and backward interpolation formulae (without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof). Numerical differentiation using Newton's forward & backward formulae.


Unit-II

FOURIER SERIES, FOURIER TRANSFORMS, Z-TRANSFORMS:
Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous functions and functions having infinite number of discontinuities, even and odd functions. Half-range series, Practical Harmonic Analysis.


Z - transform - definition, standard forms, Linearity property, damping rule, shifting rule-problems.

Unit-III

PARTIAL DIFFERENTIAL EQUATIONS:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Solution of equation of the type: , Charpit's method, Solution of PDE by the method of separation of variables.

Derivation of one-dimensional heat and wave equations. Numerical solutions (finite difference) of One-dimensional heat and Wave equations by explicit method, Laplace equation by using standard five points formula.

Unit-IV

LINEAR ALGEBRA:
Rank of a matrix by elementary row transformations, Consistency of system of linear equations, Gauss elimination method, Gauss - Seidel method, characteristic values and characteristic vectors of matrices (no theorems), Largest Eigen value and the corresponding Eigen vector by Power Method.

CALCULUS OF VARIATIONS:
Variation of a function and a functional, Extremal of a functional, Variational Problems, Euler's equation, Standard variational problems including geodesies, minimal surface of revolution, hanging chain and Brachistochrone problems.


REFERENCE BOOKS: Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.
UNIT -I

Simple stress Strain:

Thermal Stresses:
Strains including compound bars.

10 hrs

UNIT-II

Elastic Constants:

04 hrs

Compound stresses and thin cylinders:
Introduction, stress components on inclined planes. General two dimensional stress system, Principal planes and stresses. Thin cylinders subjected to internal Pressure, change in length, diameter and volume.

07 hrs

UNIT-III

Bending stress and shear in beams:

08 hrs

Deflection of beams:
Introduction, Definitions of slope, deflection, Elastic curve, Derivation of deferential equation of flexure, slope and deflection for standard loading cases using Macaulay’s method and double Integration method.

06 hrs

UNIT-IV

Torsion of circular shafts:
Introduction, Pure torsion equation for circular shafts, strength and stiffness, Torsional rigidity, torsional flexibility and polar modulus. Power transmitted by shaft, Solid and hollow circular sections.

06 hrs

Elastic Stability of Columns:
Introduction, Euler’s theory on columns, Effective length, Slenderness ratio. Short and long columns, radius of gyration, buckling loads. Assumptions, Derivations of Euler’s buckling load for different end conditions, Limitations of Euler’s theory, Rankine’s formula.

08 hrs

Text Books:

Reference Books:
2. Timoshenko and Young Affiliated- "Elements of Strength of Materials" "East-West Press.

Question paper pattern for SEE:
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3. Any Five Full Questions are to be answered choosing at least one from each unit

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<tbody>
<tr>
<td>1.</td>
<td>To make the students to understand the behavior of ductile materials under the action of external loads.</td>
<td>Develop an ability to understand the load carrying capacities of beams, columns etc.</td>
</tr>
<tr>
<td>2.</td>
<td>To work from basics of mechanics and to understand various types of deformations of bodies.</td>
<td>Develop an ability to analyze the possible deformations of members.</td>
</tr>
<tr>
<td>3.</td>
<td>To analyze the stresses and strains developed due to different types of external forces.</td>
<td>Students will understand the requirement of materials to carry the external forces.</td>
</tr>
<tr>
<td>4.</td>
<td>To workout the load carrying capacities of various structural members.</td>
<td>By applying the basic concepts students can analyze the Safe conditions of members under the action of external forces.</td>
</tr>
</tbody>
</table>
UCV311C : MATERIALS OF CONSTRUCTION
3 Credits (3-0-0)
UNIT-I

Building Stones, Bricks, Tiles and Timber

05 Hours

Other Building Materials

05 Hours

UNIT-II
Cement and Aggregates

10 Hours

UNIT-III
Fresh Concrete

05 Hours

Hardened Concrete

05 Hours

UNIT-IV

Special Concretes
Lightweight concrete- Constituents, properties and applications. High density concrete- constituents, properties and applications. High strength and High performance concrete, Fiber Reinforced Concrete, Ready Mixed Concrete, Self Compacting Concrete, Polymer Concrete.

04 Hours

Cost Effective Building Materials
Cost concepts in Buildings, Cost saving techniques in planning, design and construction.

03 Hours

Alternate Building Materials
Different types of Building blocks and their uses, Ferro-cement, Fiber Reinforced Polymer Composites.

03 Hours

TEXTBOOKS

REFERENCE BOOKS
5. Concrete P. Kumar Mehta & Paul J M Monteiro Indian Concrete Institute U.S.A-1999

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.
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<td>1.</td>
<td>To learn different materials of construction, Types and manufacture of cement.</td>
<td>After studying the course the student will gain the knowledge of: Different materials construction and Cement: Types and Testing.</td>
</tr>
<tr>
<td>2.</td>
<td>Testing of Cement, Fresh concrete, measurement of workability of Concrete.</td>
<td>Aggregate: Types, Testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh concrete: Measurement of workability</td>
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<td></td>
<td></td>
<td>Hardened concrete: Testing of cubes, cylinder and beams</td>
</tr>
</tbody>
</table>

UCV312C ENGINEERING GEOLOGY
3 Credits (3-0-0)

Unit-I

Introduction
Geology- its sub divisions, Importance of Geology in Civil Engineering. Internal Structure and Composition of earth.


Unit-II

Petrology
Introduction, definitions and general classification of Rocks; Rock cycle. Igneous Rocks General characters, mode of occurrence, structures and textures, classification; study of important igneous Rocks and their significance in Civil Engg.

Sedimentary Rocks - General characters, mode of occurrence, structures and classification; study of important sedimentary rocks and their significance in Civil Engg.

Metamorphic Rocks - General characters; Definition; meaning of metamorphism; mode of occurrence; Agents of metamorphism; Types of metamorphism; structures & study of important metamorphic rocks and their significance in Civil Engg.

Geomorphology and Geo-dynamics
Epigene and hypogene Geological Agents; Weathering of rocks agents and types of Weathering; significance of Weathering in Civil Engg. Soil Formation, profile, classification, erosion and conservation. Earthquakes - Causes and effects, plate tectonics and seismic resistant structures.

Stability of slopes Landslides- causes, effects and preventive measures. 10 Hours

Unit-III

Structural Geology
Basic definitions outcrop, inlier, outlier, dip and strike; Use of Clinometer compass and Brunton compass.
Study of important Geological structures- Faults, Folds, Joints and Unconformities
Definition, Classification, recognition in the field and significance in Civil Engineering.
Selection of sites for Civil Engineering Projects
Selection of sites for Dams and reservoirs; Tunnels, bridges and Highways.
Characters of good building stones, road metals Railway ballast concrete aggregates and decorative stones.

Unit-IV

Hydrogeology
Hydrological cycle, water bearing properties of rocks and soils; Aquifers and their types.

Environmental Geology and Remote sensing
Impact of mining, quarrying and reservoirs on Environment.
Remote sensing basic concepts and applications in Civil Engineering; GIS,
GPS-Applications in Civil Engineering

Text Books

Reference Books

Question Paper Pattern for SEE:
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<td>1.</td>
<td>To provide essential details of mineral and rocks, their physical and engineering. Properties and applicability in different civil engineering projects.</td>
<td>Student will get basic knowledge of: Earth’s materials on which he will construct and from which he will construct.</td>
</tr>
<tr>
<td>2.</td>
<td>To give information about weathering, geological structure and their significance in civil engineering.</td>
<td>Students will know the possible geological problems while selecting site for important Civil engineering projects and how to overcome those problems.</td>
</tr>
<tr>
<td>3.</td>
<td>To know that how cost, stability and safety of any civil engineering project is decided by geology.</td>
<td>Students will learn to design a safe, stable and economic civil engineering projects.</td>
</tr>
<tr>
<td>4.</td>
<td>To develop ability in students to select ideal sites of dams, reservoirs, tunnel, highways, bridges.</td>
<td></td>
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</tbody>
</table>
Introduction
Surveying - Definition, Object and Classification. Units of Measurements, Plan& Map, Basic principles of surveying, Precision and Accuracy, Ranging of line - Direct and Indirect, Survey of India topographic numbering & scales.

UNIT-I

Chain Surveying
Chain and types, Tape and types, Measurement of distances over sloping ground, Chain and Tape corrections (No derivations), Numerical problems. Booking of chain survey work, Field Book- entries, conventional symbols. Obstacles in chain survey- Numerical problems. Error in chain survey and precautions to be taken, corrections (chain and tape).

UNIT-II

Compass Surveying
Types of Compass, Difference between Prismatic Compass and Surveyor's Compass. Types of Meridians and Bearings- Numerical problems. WCB and RB & conversions, Dip and Declination, Determination of true bearings. Computation of included angles of a closed traverse.

Compass Traversing
Local attraction-determination and correction, Latitude and Departure, Dependent and Independent coordinates. Checks for closed traverse and determination of closing error and its direction- Bowditch's graphical method, Analytical methods - Bowditch's rule and transit rule, Omitted measurements. (Length and bearing of the same line).

UNIT-III

Levelling:
Definition, Objective, Temporary adjustment of dumpy level, Curvature and Refraction corrections, Type of levelling-Differential levelling, Reciprocal levelling, Profile levelling, Cross sectioning, Fly leveling & Fly back leveling, Booking of levels, Rise and Fall method and Height of Instrument method and numerical problems, missing data problems

Permanent adjustments Fundamental lines & their desired relations two peg test.

UNIT-IV

Contouring
Contours and their characteristics, Methods of contouring, Direct and indirect methods, Interpolation techniques, Uses of contours.

Areas and Volumes
Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method, Planimeter-Principle, working and use, Digital Planimeter, Volume calculation by cross section, Computations of volumes by trapezoidal and Prismatic rule, Capacity contours.

TEXTBOOKS:
2. A.M. Chandra, 'Plane Surveying' Vol-1 - Newage International ® Ltd. New Delhi, 2002

REFERENCE BOOKS:
4. Survey of India Publication on maps.

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.

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<tr>
<td>1.</td>
<td>Student will come to know the objects of surveying which is applicable in civil engineering.</td>
<td>Knowledge of different types of surveying instruments.</td>
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<tr>
<td>2.</td>
<td>Basic Principles of surveying and different fields where surveying is done.</td>
<td>Method of determining the elevation of the object with respect to sea level/TBM.</td>
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<tr>
<td>3.</td>
<td>Student will learn what type of instruments are used for surveying work i.e. chain, dumpy leveling compass surveying.</td>
<td>Plotting of Contour Map by different Methods and Setting bearing.</td>
</tr>
</tbody>
</table>
UCV-314C: BUILDING PLANNING AND DRAWING
3 Credits (2-0-2)

1. To prepare working drawing of component of buildings
   i) Stepped wall footing and isolated RCC column footing.
   ii) Fully paneled and flush doors
   iii) Half paneled and half-glazed window
   iv) RCC dog legged and open well stairs
   v) Steel truss

2. Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio

3. Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings
   i) Single Storied Building with Two bed room
   ii) Two Storied Building

4. Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building
   i) Primary health centre
   ii) Primary school building
   iii) College canteen
   iv) Office building

5. For a given single line diagram, preparation of water supply, sanitary and electrical layouts

REFERENCE BOOKS:
2. National Building Code, BIS, New Delhi

CIE Marks
30 marks for term work
20 marks for test conducted at the end of the semester of 4 hrs duration on the line of syllabus mentioned above

Term Works Details
Sheet No : 1 to 4 from chapter No-1 Sheet No : 5 to 8 from chapter No-3 Sheet No : 9 to 13 from chapter No-4
Sheet No : 14 to 15 from chapter No-5

Scheme of Examination
Part-A
Compulsory question from chapter No-3 for 60 marks

Plan
Elevation
Section
Schedule of opening

Part-B
Four questions from chapters 1, 2, 4 and 5 should be set out of which Two have to be answered (20×2=40 marks)

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<td>1.</td>
<td>Students are made to prepare working drawing of various components of building such as foundation, doors, windows, stairs, trusses etc.</td>
<td>After studying the course the student is able to prepare the working drawings for various components of the building such as foundation, doors, windows, stairs, trusses etc.</td>
</tr>
<tr>
<td>2.</td>
<td>Develop plan, elevation, and sectional elevation of single storied and double storied buildings.</td>
<td>Prepare the plane, elevation and sectional elevation for a single and double storey two bed room house.</td>
</tr>
<tr>
<td>3.</td>
<td>To develop bubble and single line diagram for the public buildings.</td>
<td>Prepare the bubble diagram and single line diagram for various public buildings like, schools, canteens, hospitals, office buildings etc.</td>
</tr>
<tr>
<td>4.</td>
<td>To develop the single line diagram for water supply, sanitary and electrical layouts.</td>
<td>Prepare water supply and sanitary layouts</td>
</tr>
</tbody>
</table>

Total 100 Marks
UCV 315L: SURVEYING PRACTICE -1
CREDIT: 1.5 (0-0-3)

Chain Surveying
1. Types of Chains and Tapes
2. Setting out Perpendiculars at various points (point on the chain line and out side the chain line)
3. Setting out hexagon, pentagon
4. Over coming from obstacles in Chain Surveying

Compass Surveying
5. Types of Compass & Difference
6. Setting out pentagon, hexagon

Levelling
7. Differential Levelling
8. Booking and Reducing levels- i) Height of Instrument method and ii) Rise & Fall method
9. Fly levelling and Fly back levelling
10. Reciprocal levelling
11. Profile and cross section levelling

Contouring
12. Block Contouring

Demonstration of minor instruments:
Instruments
a) Plane Table and its accessories
b) Planimeter
c) Digital Planimeter

REFERENCE BOOKS:

Laboratory Assessment
Each Laboratory Subject is evaluated for 100 marks (50 CIE and 50 SEE)
1. Allocation of 50 marks for CIE
   Performance and Journal write-up:
   Marks for each experiment = 30 marks / No. of proposed experiments.
   One Practical test for 20 marks (5 write-up, 10 conduction, calculation, results etc 5 viva-voice).
2. Allocation of 50 marks for SEE
   25% write-up, 50% conduction, calculation, results etc 25 % viva-voice.

UCV 316L: BASIC MATERIAL TESTING LAB
1.5 CREDIT (0-0-3)

1. Tension test on mild steel and HYSD bars.
2. Compression test on Wood.
3. Torsion test on mild steel circular sections.
4. Bending test on Wood under two point loading.
5. Shear test on Mild steel.
6. Impact test on Mild steel (Charpy & Izod)
7. Hardness tests on ferrous and non-ferrous metals- Brinell's Rockwell and Vicker's.
8. Test on Bricks and Tiles.
9. Test on Fine aggregates "Moisture content, Specific gravity, Bulk density, Sieve Analysis and Bulking"
10. Test on coarse aggregates: Absorption, "Moisture content, Specific gravity, Bulk Density, Sieve Analysis

REFERENCE BOOKS:
5. Relevant IS Codes

Laboratory Assessment
Each Laboratoy Subject is evaluated for 100 marks (50 CIE and 50 SEE)
1. Allocation of 50 marks for CIE
   Performance and Journal write-up:
IV SEMESTER
UMA401C ENGINEERING MATHEMATICS - IV
CREDITS (4-0-0)

UNIT-I

COMPLEX VARIABLES:
Analytic functions, Cauchy-Reimann equations in Cartesian and Polar forms -consequences, construction of analytic function (Cartesian and polar forms), Definition of Conformal transformations: $Z^2$, $e^a$ and $z + a^2/z (z \neq 0)$ Bilinear transformations.

Complex Integrations: Line integral, Cauchy's theorem corollaries, Cauchy's integral formula. Taylor and Laurent's series (statements only), Singularities, Poles, Calculation of Residues, Residue theorem (Without proof) - problems. Contour Integration. 14 Hours

UNIT-II

SPECIAL FUNCTIONS:
Series solution of ordinary differential equation about ordinary point and regular singular point, Hypergeometric, Hermite, Legendre, Bessels and Chebyshev equations. Recurrence formulae, Generating function, orthogonal property, Rodrigue's formula. 14 Hours

UNIT-III

STATISTICS AND PROBABILITY:
Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$, $y = a + bx + c x^2$. Correlation and Regression. Probability - addition rule, conditional probability, multiplication rule, Bayes' rule. Discrete and continuous random variables- PDF-CDF, Binomial, Poisson and Normal distributions 12 Hours

UNIT-IV

SAMPLING DISTRIBUTION:
Sampling, Sampling distribution, Standard error, Null and alternate hypotheses, Type I and Type II errors, Testing of hypothesis for Means, Level of Significance for Means, Confidence limits for Means, large and small samples, Student's $t$-distribution. Central limit theorem (without proof)

JOINT ROBABILITY DISTRIBUTION AND MARKOV CHAINS:
Concept of joint probability, Joint distributions - discrete random variables, Independent random variables, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states. 12 Hours

2) Theory and Problems of Probability by Seymour Lipschutz (Schaum' Series) - Relevant articles of Chapter 5 and Chapter 7.

REFERENCE BOOKS: Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question Paper Pattern:
1. Total of Eight Questions with Two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than 4 sub divisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Text Books:

Reference books
4. C.K. Wang Intermediate Structural Analysis
Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four subdivisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.

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<td>1.</td>
<td>The basic concepts, structure and application of Structural analysis.</td>
<td>To develop an ability to apply knowledge of mathematics science and engineering.</td>
</tr>
<tr>
<td>2.</td>
<td>To work from the basis of mechanics and energy principle to formulate the strength and stiffness methods of analysis of structures.</td>
<td>Develops an ability to aquire the knowledge of solution procedures &amp; hence analyse structures.</td>
</tr>
<tr>
<td>3.</td>
<td>To work on various determinate and indeterminate structures like beams, frames, trusses and arches and cables.</td>
<td>Develops an ability to carry out force analysis &amp; deformation analysis of beams, frame &amp; trusses.</td>
</tr>
<tr>
<td>4.</td>
<td>To utilize these models to analyze structural responses to variety of loads.</td>
<td>Students develop an ability to identify formulate and solve an engineering problem.</td>
</tr>
<tr>
<td>5.</td>
<td>This helps the students in using modern structure analysis software &amp; forms a basis for learning structural analysis II.</td>
<td>Students develop an ability to use the techniques skills, modern engineering tools necessary for engineering practice.</td>
</tr>
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UCV405C: HIGHWAY ENGINEERING
3 CREDITS (3-0-0)

UNIT-I

Introduction
A brief idea about the historical development of road construction in India and abroad. Importance of transportation modes-characteristics-comparison of different modes. Highway development in India- Jayakar committee, recommendation- CRF-IRC-3M twenty year road development plan and problems. 05 Hours

Highway planning alignment and surveys
Planning surveys-master plan-saturation system. Factors controlling alignment-ideal alignment Engineering surveys for highway locations- problems on phasing 05 Hours

UNIT-II

3. Highway Geometric design-1: Importance, Factors controlling the design of geometric elements, highway cross section elements- pavement surface characteristics, camber, width of carriage way, shoulder width, formation width, right of way, typical cross section of roads 04 Hours

4. Highway Geometric design 2 : Sight Distances Types and importance-Design of horizontal and vertical alignment- Numerical problems on above (No. derivation of formulae) 06 Hours

UNIT-III

5. Highway Materials: Properties and requirement of sub grade Soil- Tests on Soils (CBR and plate load tests) properties and requirement of road aggregates Bitumen Tar- Emulsion- cut back (Tests are not included) 04 Hours

6. Design of Highway Pavement: Types of Pavements- Factors to be considered in the design of pavements- IRC method of flexible pavement design based on GL- CBR- CSA method. Wester gaards analysis of wheel load stresses- Temperature stresses in rigid pavements- Problems on above. 06 Hours

UNIT-IV

7. Highway Constrution: General specification and construction of Earth road- Gravel roads- WBM roads- Bituminous roads- cement concrete pavements 05 Hours

8. Highway drainage and Economics: Surface and subsurface drainages system for roads types, functions.
Highway user benefits VOC using charts only. Highway Costs- Economics analysis by annual cost method and benefit cost ratio methods. BOT and BOOT concepts. 05 Hours
Test Books:

Reference Books:
1. Relevant IRC codes

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit. Any five full questions are to be answered.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Objectives</th>
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<tbody>
<tr>
<td>1.</td>
<td>Planning, designing, construction and maintains of pavements.</td>
<td>Design the various geometric elements of roads such as cross sectional elements, super elevation, extra widening, horizontal curves, and vertical curves.</td>
</tr>
<tr>
<td>2.</td>
<td>To teach the details of the cross-sectional element.</td>
<td>Design the pavements with respect to G I method, C B R method and C S A method.</td>
</tr>
<tr>
<td>3.</td>
<td>To teach the geometric design of various components of pavements.</td>
<td>Construct the different types of pavements.</td>
</tr>
<tr>
<td>4.</td>
<td>To teach the different construction methods. To teach drainage in roads.</td>
<td></td>
</tr>
</tbody>
</table>

UCV411C : FLUID MECHANICS
04 Credits (4-0-0)

UNIT-I
Scope and importance of FM, Definition of fluid, Types of fluids, Difference between fluid and solids, Difference between liquid and gas. 04 Hours
Definition units and Dimensions of Mass density, Specific volume, specific weight, Relative density, viscosity, Newton's law of viscosity, Newtonian & Non Newtonian fluids, Ideal and Real fluids Definitions of surface tension, Equation for stability of bubble, Capillarity, Theory and problems, Problems on Newton's law of viscosity 07 Hours

UNIT-II
Definition of pressure units and dimensions, pressure at a point, Pascal's law, Hydrostatic law, different types of pressure and its measurement, manometers and their classification, simple manometer. Theory and problems Differential manometers theory and problems, problems on fluid pressure, Mechanical pressure gauges and its use. 06 Hours
Definition of Total pressure, centre of pressure, centriodal depth, centriod, depth of centre of pressure MI and centroid table for different geometric shapes, Equation for hydrostatic force and depth of CP on a plane surface (vertical and inclined), Problems on hydrostatic force vertically and inclined submerged surface, hydrostatic force on curved submerged surface problem. 07 Hours

UNIT-III
Description of fluid flow by Lagrangian and Eulerian approaches, classification of flow, Definition of Path line streamline streak line stream tube, one, two and three dimensional flows, Rotational & irrotational flows, Acceleration and Derivation of continuity equation in differential form. Definition of velocity potential function, stream functions, stream line equipotential line and relation between them, Laplace equation, problems on continuity equation, velocity potential and stream function. 07 Hours
Definition, concept of force, Equation of motion, Introduction to non dimensional number. Derivation of Euler's equation and Bernoulli's equation for ideal & real fluid with assumptions and limitations. Problems on Bernoulli's equation Application of Bernoulli's equation to pitot tube, venturimeter and problems on these. 06 Hours

UNIT-IV
Definition, Reynolds's number classification of flow, HGL and TEL, major and minor losses in pipe flow, Derivation of equation for head loss due to friction (Darcy's equation), friction factor for commercial pipes, moody diagram, flow through compound pipes, (Series Parallel, Equivalent size), problems on Darcy's equation for Head loss due to sudden expansion and contraction and problems on minor losses Problems on compound pipe. 07 Hours
Flow through orifice and mouthpieces hydraulic coefficient of an orifice and relation between them. Equation for coefficient of velocity. Coefficient discharge and coefficient contraction relation between them. Flow through notches, classification of notches equation for discharge over V-notch, rectangular and trapezoidal cripoletti notch and problems, on them Broad crested weir Equation for discharge of Broad crested weir and problems.

06 Hours

TEXTBOOKS:

REFERENCE BOOKS :

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.
Text Books/Reference Books
4. Concrete Mix Design Code IS 10262-1982

Lean to roof, Flat terraced roofing, Wooden truss (king post and queen post trusses), Steel trusses. 05 Hours

UNIT III
Arch, Lintel, Cheija, Balcony Masonry arches, Classification, Stability of an arch, Lintels, Types and classifications, Functions, Cheija, Functions, Canopy - Functions, Balcony - Functions, Shoring, Underpinning, Scaffolding. 05 Hours

Plastering and Painting
Purpose of plastering, Materials of plastering, Lime mortar, Cement Mortar, Methods of plastering, Stucco plastering, Lath plastering, Purpose of Painting, Application of paints to new and old surfaces, Distemper, Plastic emulsion, Enamel Powder coated painting to walls and iron and steel surfaces, Polishing of wood surface. 05 Hours

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<tr>
<td>1.</td>
<td>To learn different types of foundations and to determine the SBC of soil.</td>
<td>Student will come to know the types of foundations, determination of SBC.</td>
</tr>
<tr>
<td>2.</td>
<td>Different types of stairs, windows and ventilations, Different types of roofs and floors.</td>
<td>Different components of building in existing and finishing stage.</td>
</tr>
<tr>
<td>3.</td>
<td>Different modules of building construction, Concrete mix design, plumbing, formwork.</td>
<td>To design a concrete mix for a given grade.</td>
</tr>
</tbody>
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Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.

UCV413C: SURVEYING II
4 Credits (4-0-0)

Unit-I
Theodolite: Parts of a theodolite, fundamental lines and their desired relations, Temporary adjustments. Measurement of horizontal and vertical angles by repetition and reiteration methods 05 Hours

Trigonometric Surveying : Heights And Distances : Determination of height of (i) An accessible object and (ii) Inaccessible object- single plane and double plane methods. Determination of distance and difference in elevation between two inaccessible points. 08 Hours

Unit-II
Simple Curves-Definition, Designation-Elements of curves-Definition & derivation. Setting out of simple curves a) Linear methods-perpendicular offsets from long chord and chords produced method & b) Instrumental methods-Rankine's Method. 05 Hours

Compound Curves-Definition, Elements, Various cases (No derivations), setting out-instrumental method, Numerical problems. 04 Hours

Reverse curves- Definition, Elements, parallels straights method (No derivation), setting out by instrumental method. 04 Hours

Unit-III
Transition Curves (cubic parabola) -Definition, Super Elevation, Determination of length of transition curves (03 methods) (No derivations), Setting out by instrumental method, Numerical problems. 08 Hours

Vertical Curves- Definition and types, Determination of length of vertical curves-summit & valley curves (No derivation) Numerical problems 05 Hours

TEXTBOOKS:
1. B.C. Punmia, Surveying Vol- II 12th Edn- Std. book house Laxmi
2. A.M. Chandra, *Plane surveying Vol II* New age international (P) Ltd. New Delhi 2005
3. A.M. Chandra *Higher Surveying* New age international (P) Ltd, 2nd Revised Edn. 2005

**REFERENCE BOOKS:**

**Tacheometry:** Definition, instruments used. Characteristics-Types of tacheometry, stadia method, principle - determination of constant (Horizontal line of sight). Derivation of height & distance formulae, staff held vertical & normal to the line of sight. Analeptic lens, Movable hair method-Principle, Stadia diaphragm, Tangential method-principle, height & distance formulae, numerical problems on above methods-Reduction of stadia notes.  

10 Hours

**Advanced Surveying Instruments:** Total Station, GPS Instruments – working principle and use.  

03 Hours

**UCV408L: ENGINEERING GEOLGY LABORATORY**  
1.0 Credit (0-0-2)

1. Megascopic Identification of Minerals based on their Physical properties; Quartz and its varieties.
2. Megascopic Identification of Minerals based on their Physical properties; Felspars, Micas, Hornblende, Olivine, Serpentine, Asbestos, Kyanite, Tate, Garnet, Corundum and Barite.
3. Megascopic Identification of Minerals based on their Physical properties Carbonates and Ore minerals.

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<td>2.</td>
<td>Handling of theodolite, point positioning traverse.</td>
<td>Knowledge of topography and route surveys and traces.</td>
</tr>
<tr>
<td>3.</td>
<td>Setting and finding out of gradients, study of modern instruments like total station and global positioning system (GPS).</td>
<td>Knowledge of curves.</td>
</tr>
</tbody>
</table>

7. Study and Interpretation of standard Geological Maps.
10. Thickness Problems.

**Reference Books:**


**Laboratory Assessment**

Each Laboratory Subject is evaluated for 100 marks (50 CIE and 50 SEE)

1. Allocation of 50 marks for CIE
UCV414L: Concrete Testing Lab
1 Credit (0-0-2)
1. **CEMENT**: Normal consistency, setting time, soundness by Autoclave method, compression strength test and Air permeability test for finness, Specific gravity of cement
2. **FRESH CONCRETE**: Workability-slump, compaction factor and Vee Bee tests
3. **HARDENED CONCRETE**: Compression strength & Splittensile test.

**REFERENCE BOOKS:**
1. M.L.Gambhir "Concrete Manual" Dhanpat Rai & Sons New Delhi **Note:**
   1. Minimum Ten Experiments are to be completed.
   2. Candidate has to perform two experiments in the Semester Eng Examination

**LABORATORY ASSESSMENT:**
1. Each Laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
2. Allocation of 50 marks for CIE

**REFERENCE BOOK:**

Each Labrotary Subject is evaluated for 100 marks ( 50 CIE and 50 SEE)
1. Allocation of 50 marks for CIE
   - Performance and Journal write-up:
   - Marks for each experiment = 30 marks / No. of proposed experiments.
   - One Practical test for 20 marks. (5 write-up , 10 conduction, calculation, results etc 5 viva-voice).

UCV415L- Surveying Practice - II
1.0 Credit (0-0-2)
1. Measurement of Horizontal angle by method of a) Repetition and b) Re-iteration method
3. Measurement of horizontal distance and elevation by Single plane method when base is a) accessible and b) when base is in-accessible.
4. Measurement of horizontal distance and elevation by Double plane method when base is in-accessible.
5. To determine Tacheometric constants.
6. To determine inaccessible distance by tacheometry when line of sight is a) horizontal and b) inclined.
7. To setout a simple curve by linear methods:
   a) Offsets from long chord i) Exact method ii) App. Method
   b) Offsets from tangents i) Perpendicular ii) Radial
   c) Successive bisection of arcs
   d) Deflection distances (Chords produced)
8. To setout a simple curve by Instrument method: Rankine's deflection method
9. To setout a compound curve with angular methods.
10. To set out center line & excavation line of a rectangular room using offsets from single base line method & a column of a building using double base line method
11. To determine height of remote object, horizontal distance & co-ordinates of points by using total station.

**Laboratory Assessment**
Each Labrotary Subject is evaluated for 100 marks ( 50 CIE and 50 SEE)
1. Allocation of 50 marks for CIE
   - Performance and Journal write-up:
   - Marks for each experiment = 30 marks / No. of proposed experiments.
One Practical test for 20 marks. (5 write-up, 10 conduction, calculation, results etc 5 viva-voice).

2. Allocation of 50 marks for SEE
   □ 25% write-up, 50% conduction, calculation, results etc 25% viva-voice.

Reference Books
2. A.M. Chandra, Plane Surveying Vol-II, Newage International Ltd.

UMA400M: ADVANCED MATHEMATICS-II
(Mandatory Subject) (Common to all branches)

1) Solid Geometry:
Distance formula (without proof), Division formula, Direction cosines and Direction ratios, planes and straight lines, angle between the planes
12 Hours

2) Vectors:
Vector Algebra:
Vector addition, multiplication (Dot and Cross products), Triple products. Vector differentiation: Velocity, Acceleration of a vector point function, gradient, curl and divergence, solenoid and irrotational fields, simple and direct problems
12 Hours

3) Laplace transforms:
16 Hours

Text Books:

Question Paper Pattern:
1. Total of Eight Questions to be set uniformly covering the entire syllabus.
2. Each question should not have more than 4 sub divisions.
3. Any five full questions are to be answered