CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)
SCHEME OF TEACHING AND EXAMINATION
M.E./M.Tech. II¹ND SEMESTER CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>S.No</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Periods per week</th>
<th>SCHEME OF EXAMINATION</th>
<th>TOTAL MARKS</th>
<th>Credit</th>
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<td>CIVIL ENGG</td>
<td>520211(20)</td>
<td>Design of Hydraulic Structures</td>
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<td>520212(20)</td>
<td>Advanced Design of RCC &amp; Steel Structures</td>
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<td>6</td>
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<td>520221(20)</td>
<td>Soft Computing Lab</td>
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<td>75 - 75</td>
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<td>Experimental Stress Analysis Lab</td>
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ELECTIVE - II

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<tr>
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<td>520231(20)</td>
<td>Advanced Transportation Engineering</td>
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<td>520232(20)</td>
<td>Earthquake Engineering</td>
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<td>520233(20)</td>
<td>Modern Surveying Techniques</td>
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<td>4</td>
<td>Civil. Engg</td>
<td>520234(20)</td>
<td>Experimental Stress Analysis</td>
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Note – 1) 1/4ʰ of total strength of students is required to offer an elective in the college in a Particular academic session.

2) Choice of elective course once made for an examination cannot be changed in future examinations.
UNIT 1  Investigation and Planning - Preliminary investigations and preparation of reports, Layout of projects, Geological and hydrological investigations.

UNIT 2  Analysis and Design of Dams - Earthen Dam and Gravity Dam.

UNIT 3  Analysis and Design of Arch Dam, Infiltration Gallery, Collector wells.


UNIT 5  Design of Weirs on Permeable foundation - Creep theory, Potential theory, Flow nets, design of weirs - Khosla’s theory.

References
2. Kushalani, K.B., Irrigation (practice and design) Vol. III and IV.
UNIT I
DESIGN PHILOSOPHY: Limit state design - beams, slabs and columns according to IS Codes. Calculation of deflection and crack width according to IS Code - Design of slender columns.

Flat Slabs and yield line based design: Design of flat slabs and flat plates according to IS method – Check for shear - Design of spandrel beams - Yield line theory and Hillerborg’s strip method of design of slabs.

UNIT II

UNIT III
DESIGN OF STEEL TRUSS GIRDER BRIDGES: Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT IV
General Design of members subjected to combined forces – Design of Purlins, Louver rails, Gable column and Gable wind girder – Design of simple bases, Gusseted bases and Moment Resisting Base Plates.

UNIT V

TEXT BOOKS:


REFERENCES:

Design of Steel Structures Galyord & Gaylord, Publisher ; Tata Mc Graw Hill, Education. Edition 2012
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: M.E./M.Tech.- II 
Branch: Civil Engineering

Subject: Soft Computing Techniques in Civil Engineering
Code: 520213(20)

Total Theory Periods: 40
Total Tutorial Periods: 12
Total marks in End Semester Examination: 100
Minimum number of class tests to be conducted: 2


UNIT II STRUCTURAL ANALYSIS Computer method of structural analysis – Simulation and Analysis of steel sections I, channel and Angle – RCC and Composite members - Nonlinear Analysis through software packages


UNIT IV OPTIMIZATION Introduction to Optimization – Applications of Linear programming – Simplex Algorithm – Post Optimality Analysis – Project scheduling – CPM and PERT Applications.


Text Books:

REFERENCES:


UNIT-III Ventilation and Indoor Air Quality Control; An Overview of Indoor Air Quality; The Basics of HVAC Systems; IAQ Issues and Impacts on Occupants; Application of Audits to Developing an IAQ Profile; Developing Management Plans; IAQ Problems; Control; Quantification and Measurement, Air Pollution Dispersion-Dispersion Theory Basics- Air Quality Impact of Stationary Sources- Models and Resources


TEXT BOOKS:
1. Grady, C.P.L, Daigger, G and Lim, H.C, Biological Wastewater Treatment, 2nd Ed, Marcel Dekker, 1999

REFERENCES:
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: M.E./M.Tech.- II  Branch: Civil Engineering
Subject: Advanced Transportation Engineering  Code: 520231(20)
Total Theory Periods:  40  Total Tutorial Periods:12
Total marks in End Semester Examination: 100
Minimum number of class tests to be conducted: 2

UNIT-I  Design principle and methods for flexible and rigid pavements.
UNIT-II  **TRAFFIC CHARACTERISTICS:** Basic traffic characteristics - Speed, volume and concentration. Relationship between Flow, Speed and Concentration.
UNIT-III **TRAFFIC MEASUREMENT AND ANALYSIS:** Volume Studies - Objectives, Methods; Speed studies - Objectives: Definition of Spot Speed, time mean speed and space mean speed; Methods of conducting speed studies.
UNIT-IV **PARKING STUDIES AND ANALYSIS:** Types of parking facilities - on street parking and off street Parking facilities; Parking studies and analysis.

TEXT BOOK:
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

 Semester: M.E./M.Tech.- II Branch: Civil Engineering
 Subject: Earthquake Engineering Code: 520232(20)
 Total Theory Periods: 40 Total Tutorial Periods: 12
 Total marks in End Semester Examination: 100
 Minimum number of class tests to be conducted: 2


UNIT IV EARTHQUAKE RESISTANT DESIGN OF RC Design of Reinforced concrete buildings for earthquake resistance-Load combinations, Ductility and energy absorption in buildings. Confinement of concrete for ductility, design of columns and beams for ductility, ductile detailing provisions as per IS-1893. Structural behaviour, design and ductile detailing of shear walls.


Text Books:
## CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

**Semester:** M.E./M.Tech.- II  
**Branch:** Civil Engineering  
**Subject:** Modern Surveying Techniques  
**Code:** 520233(20)  
**Total Theory Periods:** 40  
**Total Tutorial Periods:** 12  
**Total marks in End Semester Examination:** 100  
**Minimum number of class tests to be conducted:** 2

### Unit I  
**Fundamentals of Surveying**  
Principles of surveying, types of surveying, classification of surveys & maps, Plan Vs Map, Accuracy Vs Precision, sources and kinds of error; Least Squares adjustments and applications.

### Unit II  
**Satellites and Sensors**  

### Unit III  
**Introduction to GIS & Data Structures**  
Spatial Elements, Spatial Measurement Level, Coordinates systems, Grids, projections, Spatial Location and Reference, Spatial Patterns, Geographic Data Collection, Populations and Sampling Schemes, Inferences from Samples.  

### Unit IV  
**EDM & Total Station**  
Principle, instrument characteristics, accessories, operation, EDM without reflecting prisms; Total Station – types, instrument description, field techniques, Traversing, motorized total stations; field procedures for total stations in topographic surveys.

### Unit V  
**Topographical Surveying: Concepts and Techniques**  
Definition, Procedure in topographic surveying, uses of topographical maps, Relief, methods of representing relief, contour and contour interval, characteristics of a contour, methods of locating contours, Interpolation of contours, Dam Surveys.

**Text Book**  
Surveying - C.Venkatramaiah, Universities Press.  
Surveying (Vol. I & II) - Dr. B.C. Punmia, Laxmi Publications, New Delhi

**Reference book**  
1.  

UNIT II  Strain Measurement using Strain Gauges: Definition of strain and its relation to Experimental Determinations, properties of strain-gauge systems, Types of strain gauges, Mechanical and Optical strain gauges. Electrical Strain Gauges - Introduction, LVDT - resistance strain gauge - various types - gauge factor, Materials for adhesion base, etc. Strain Rosettes: Introduction, The three element rectangular Rosette - The delta rosette – Corrections for Transverse strain effects.

UNIT III  Brittle Coating Method: Introduction, Coating stresses - Failure theories - Brittle coating Crack pattern - Crack detection - Types of Brittle coating - Test procedures for brittle coating analysis - Calibration procedures - Analysis of brittle coating data.


TEXT BOOKS:
1. Experimental Stress Analysis by J.W.Dally and W.F.Riley
2. Experimental Stress Analysis by Dr. Sadhu Singh

REFERENCES :
1. Experimental Stress Analysis by Dove and Adams
List of Experiments

1. Write Matlab/Scilab Program for Following
   
   \[ \text{AREA} = \pi r^2 \] (USING ARITHMETIC OPERATOR).
   
   \[ e^{150} \] (USING EXPONENTIAL OPERATOR).
   
   \[ y = \sin(2x) + \cos(2x) \] (USING TRIGONOMETRY OPERATOR).
   
   \[ y = \cos(x) + i\sin(x) \] (USING COMPLEX NUMBER).
   
   \[ y = \log_{10}(10^6) \] (USING LOGARITHMS OPERATOR).

2. Compute y- coordinates of a STRAIGHT LINE \( y = mx + c \), where slope of line \( m = 0.5 \),
   intercept \( c = -2 \) and x- coordinates : \( x = 0 \) to 10 for 0.5 increments.

3. Create following vectors t with 10 elements 1 to 10.
   
   \[ x = t \sin(t) \] \( \{ \text{A MULTIPLE VECTORS} \} \)
   
   \[ y = (t-1) / (t+1) \] \( \{ \text{A DIVIDE VECTORS} \} \)
   
   \[ z = \sin(t^2) / t^2 \] \( \{ \text{A EXPONENTIAL VECTORS} \} \)

4. PLOT \( y = \sin x \) where \( 0 \leq x \leq 2\pi \).

5. PLOT \( y = e^{-0.4x} \sin x \) where \( 0 \leq x \leq 4\pi \).

6. Write a script file to draw a unit circle

7. Write a function factorial to compute the factorial \( n! \) for any integer \( n \).

8. Write a function factorial to compute factorial \( n! \) using RECURSION for any integer \( n \).

9. Write a function file crossprod to compute the cross product of two vectors \( u \) and \( v \).

10. Write a Matlab program (m.file) to calculate union, intersection, complement and difference of two fuzzy sets. Find whether the given matrix is (a) reflexive (b) tolerance and (c) transitivity matrix or not. \( R = \)

    \[
    \begin{pmatrix}
    1 & 1 & 0 & 0 & 0 \\
    1 & 1 & 0 & 0 & 1 \\
    0 & 0 & 1 & 0 & 0 \\
    0 & 0 & 0 & 1 & 0 \\
    0 & 1 & 0 & 0 & 1
    \end{pmatrix}
    \]

    by writing an M-file.
List of Experiments

1. Study of strain gauges- principle and applications.
2. Study the response of rcc beam using dail gauges.
3. Study on crack pattern on brittle coating.
4. Study on different method of brittle coating.
5. To verify strain in an externally loaded beam with the help of strain indicator and to verify theoretically.
6. To verify theory of photo-elasticity.
7. Study on strain recording gauges- optical, mechanical and electrical strain gauges.
8. Study on properties of photo-elastic material.
10. Study on different types of fringe pattern.