# परीक्षा नियंत्रण प्रकोष्ठ, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर (म.प्र.)

क्रमांक / प.नि.प्र. / 2020 / 219 जबलपुर, दिनांक 30/12/2020

## सूचना

महाविद्यालय के B.E. / B.Tech. एवं B.E. (PTDC) कोर्स के अंतर्गत विभिन्न स्कीम के समान पाठ्यक्रम के सिलेबस की समतुल्यता संलग्न सारणी अनुसार निर्धारित की गयी है। अतः CE/EE/EC/CSE/IT/IP विभाग के विद्यार्थी सारणी के तृतीय कॉलम मे दर्शित विषयों के स्थान पर उनके सम्मुख अंतिम कॉलम में दर्शित विषय एवं Mechanical विभाग के विद्यार्थी संलग्न सारणी अनुसार सरल क्रमांक (Serial No.) में दर्शित प्रथम विषय के कोड अनुसार Final Subject Code & Subject (After Equivalence) के सेलेबस द्वारा आगामी परीक्षाओं की तैयारी करना सुनिश्चित करें।

प्राचार्य / मुख्य परीक्षा नियंत्रक
जबलपुर इंजीनियरिंग महाविद्यालय,
जबलपुर (म.प्र.)

**EQUIVALENCE OF SUBJECTS OF DIFFERENT SCHEMES**
**OF UNDER GRADUATE COURSES (B.E. / B.Tech.) OF CIVIL ENGG.**

| S.No. | Schemes | Subject Code & Subject Name (Semester) Having Equivalence in Syllabus | Final Subject code & subject (after equivalence) |
|---|---|---|---|
| 1 | Grading | CE-43 Enviromental Engg.-II **B.E./B.E. (PTDC) VII Sem.** | CE701<br>Enviromental Engg.-II<br>**B.Tech. VII Sem.** |
| | CBGS | CE7001 Enviromental Engg.-II **B.E. VII Sem.** | |
| | AICTE | CE701 Enviromental Engg.-II **B.Tech. VII Sem.** | |
| 2 | Grading | CE-41Structural design-III (RCC) **B.E./B.E.(PTDC) VII Sem.** | CE702<br>Structural Design & Drawing-III (RCC)<br>**B.Tech. VII Sem.** |
| | CBGS | CE7002 Structural Design & Drawing-III (RCC) **B.E. VII Sem.** | |
| | AICTE | CE702 Structural Design & Drawing-III (RCC) **B.Tech. VII Sem.** | |
| 3 | Grading | CE-62 Water Resource Engg.-II **B.E./B.E.(PTDC) VIII Sem.** | CE704A<br>Advanced Water Resourse Engg.<br>**B.Tech. VII Sem.** |
| | CBGS | CE8004A Advanced water resourse Engg. **B.E. VIII Sem.** | |
| | AICTE | CE704A Advanced Water Resourse Engg. **B.Tech. VII Sem.** | |
| 4 | Grading | | CE704B<br>Advanced Foundation Design<br>**B.Tech. VII Sem.** |
| | CBGS | CE7004C Advanced Foundation Design **B.E VII Sem.** | |
| | AICTE | CE704B Advanced Foundation Design **B.Tech. VII Sem.** | |

| | | | |
|---|---|---|---|
| 5 | Grading | | CE704C<br>Bridge Engineering<br>**B.Tech. VII Sem.** |
| | CBGS | CE7004D Bridge Engineering **B.E. VII Sem.** | |
| | AICTE | CE704C Bridge Engineering **B.Tech. VII Sem.** | |
| 6 | Grading | CE-45 Project Management **B.E./B.E.(PTDC) VII Sem.** | CE705A<br>Project Management<br>**B.Tech. VII Sem.** |
| | CBGS | CE7004A Project Management **B.E. VII Sem.** | |
| | AICTE | CE705A Project Management **B.Tech. VII Sem.** | |
| 7 | Grading | CE-047A Computational Methods in Structural Engg. **B.E./B.E. (PTDC) VII Sem.** | CE705B<br>Computational Methods in Structural Engg.<br>**B.Tech. VII Sem.** |
| | CBGS | CE7005B Computational Methods in Structural Engg. **B.E. VII Sem.** | |
| | AICTE | CE705B Computational Methods in Structural Engg. **B.Tech. VII Sem.** | |
| 8 | Grading | | CE705C<br>Environmental Empact Assessment<br>**B.Tech. VII Sem.** |
| | CBGS | CE7005D Environmental Empact Assessment **B.E. VII Sem.** | |
| | AICTE | CE705C Environmental Empact Assessment **B.Tech. VII Sem.** | |
| 9 | Grading | CE-50 Structural Desing-IV (Steel) **B.E./B.E.(PTDC) VIII Sem.** | CE801<br>Structural design and drawing -IV (Steel)<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8001 Structural design and drawing -IV (Steel) **B.E. VIII Sem.** | |
| | AICTE | CE801 Structural design and drawing -IV (Steel) B.Tech. VIII Sem. | |
| 10 | Grading | CE-40 Estimating costing tendering **B.E. VII Sem./B.E.(PTDC) VI Sem.** | CE802<br>Estimating costing tendering<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8002 Estimating Costing Tendering **B.E. VIII Sem.** | |
| | AICTE | CE802 Estimating Costing Tendering **B.Tech. VIII Sem.** | |

| | | | |
|---|---|---|---|
| 11 | Grading | CE-064A Pre stressd concrete **B.E./B.E.(PTDC) VIII Sem.** | CE803A<br>Pre stressd concrete<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8003A Prestressd concrete **B.E. VIII Sem.** | |
| | AICTE | CE803A Pre-stressd concrete **B.Tech. VIII Sem.** | |
| 12 | Grading | CE-064B Pavement Design **B.E./B.E. (PTDC) VIII Sem.** | CE803B<br>Pavement Design<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8003B Pavement Design **B.E. VIII Sem.** | |
| | AICTE | CE803B Pavement Design **B.Tech. VIII Sem.** | |
| 13 | Grading | CE-047B Traffic Engineering **B.E./B.E. (PTDC) VII Sem.** | CE803C<br>Traffic Engineering<br>**B.Tech. VIII Sem.** |
| | CBGS | CE7005A Traffic Engineering **B.E. VII Sem.** | |
| | AICTE | CE803C Traffic Engineering **B.Tech. VIII Sem.** | |
| 14 | ~~Grading~~ | ~~CE-054C AIR Quality Monitoring & Control **B.E./B.E.(PTDC) VIII Sem.**~~ diff. | CE804B<br>AIR Quality Monitoring & Control<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8004B AIR Quality Monitoring & Control **B.E. VIII Sem.** same | |
| | AICTE | CE804B AIR Quality Monitoring & Control **B.Tech. VIII Sem.** | |
| 15 | Grading | | CE804C<br>FRP Composites<br>**B.Tech. VIII Sem.** |
| | CBGS | CE8004C FRP Composites **B.E. VIII Sem.** | |
| | AICTE | CE804C FRP Composites **B.Tech. VIII Sem.** | |
| 16 | Grading | CE-37 Transportation Engineering-II **B.E. VIII / B.E.(PTDC) VI Sem.** | CE7003<br>Transportation Engineering-II<br>**B.E. VII Sem.** |
| | CBGS | CE7003 Transportation Engineering-II **B.E. VII Sem.** | |
| | AICTE | | |

OK

OK

OK

CE804C is different

OK

OK

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Environmental Engg.-II | CE701 | PCC | 3-0-2 | 4 |

## ENVIRONMENTAL ENGINEERING-II

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Apply matrices method (stiffness and flexibility matrices) for different structural elements |
| CO2 | Examine the structures by stiffness matrices method for different loads including temperature, shrinkage, prestressing forces. |
| CO3 | Modify the matrices in order to increase the efficiency for solving time taking computational problems by various methods |
| CO4 | Analyze the continuum structures and two dimensional Isoperimetric elements using finite element concept |

### MODULE-I

Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

### MODULE-II

Characteristics and analysis of waste water cycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self-purification capacity of stream, oxygen sag analysis.

### MODULE-III

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

### MODULE-IV

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & inhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

**MODULE-V**

Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico-chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil.

**Reference Books :-**


l. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company,(P) Ltd. New Delhi

2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi

3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company

4. Chemisfy for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi

5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi

6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi


**List of experiments:**

1. To study the various standards for waste water.

2. To study the sampling techniques for waste water.

3. To determine the alkalinity in water sample.

4. To determine the acidity in water sample.

5. Determination of Dissolved Oxygen in the water and waste water sample.

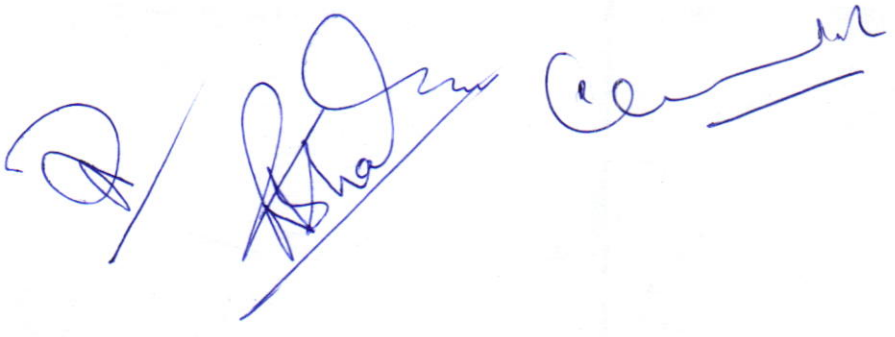
6. Determination of Biological Oxygen demand of a waste water sample.

7. Determination of Chemical Oxygen demand of a waste water sample

8. Determination of various types of solids in the waste water sample

9. Determination of bacterial number by membrane filter Technique

10. Determination of bacterial colonies by standard plat count method



| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Structural Design & Drawing.-III (RCC) | CE702 | PCC | 3-0-2 | 4 |

## STRUCTURAL DESIGN & DRAWING -III (RCC)

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Explain bracing elements, shearwall, sway/non-sway buildings, prestressing systems |
| CO2 | Analyse slab bridges, prestressed concrete beams and slabs |
| CO3 | Design multi storey building, retaining walls, overhead and underground water tank, silos and bunkers. |

**MODULE-I**

Design of Multi-storey Buildings - Sway and non sway buildings, Shear walls and other bracing elements.

**MODULE-II**

Earth Retaining Structures: Cantilever and cowter fort types retaining walls.

**MODULE-III**

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

**MODULE-IV**

Silos and Bunkers

**MODULE-V**

T-beam & Slab bridges- for highway loading (IRC Loads). Prestessing concepts materials, systems of preshessing & losses Introduction to working & limit State Design.

**Reference Books:**


1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering . D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Desigr by N.K. RAJU
6. N.Ikishna Raju, Prestessed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete . T.Y. Lin

**List of experiments**

1 .Design and drawing of multistory building.

2. Design and drawing of cantilever retaining walls.

3. Design and drawing of counter fort retaining wall.

4. Design and drawing of water tanks resting on ground.

5. Design and drawing of underground water tank.

6. Design and drawing of overhead water tanks.

7. Design and drawing of silor.

8. Design and drawing of bunkers.

9. Design and drawing of RCC slab for highway loading

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Advanced Water Resource Engineering | CE704A | PEC | 3-1-0 | 4 |

## ADVANCED WATER RESOURCE ENGINEERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Calculate the forces acting on gravity dam and stability analysis of hydraulic structures. |
| CO2 | Determine the rate of seepage using flow-net |
| CO3 | Design various types of spillways, energy dissipaters and canal regulating structures. |
| CO4 | Explain the functioning & elements of hydropower plants. |

**MODULE -I Gravity dams**

Design Criteria, forces acting on gravity dams, elementary profiie, low and high gravity dams, stability analysis, evaluation of profile by method of zoining, practical profile, foundation treatment, construction joints, galleries in gravity dams.

**MODULE - II Earth and Rock fill dams**

Earth Dams : Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore presswes, sudden draw down, steady seepage and construction pore pressure condition.

**MODULE - III Spillways**

Spillways : Various Types of Spillways, Ogee spillway and its design details of siphon shaft, chute and side channel spillways, emergency spillways.

**MODULE - IV**

Energry dissipation and gates : Principles of energy dissipation, Energy dissipaters based on tail water rating curve and jump height curves spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structutes, detailed design of sarda type canal fall. Types of cross drainage works - Aqueduct siphon aqueduct, super passage, level crossing & inlet & outlets.

**MODULE - V**

Hydropower Plants : Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft fubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

**Reference Books :-**

1. Engineering for Dams (Volumes I,II&ID by Creager. Justin & Hinds
2. Hydroelectric Hand Book by Creager.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Advanced Foundation Engineering | CE704B | PEC | 3-1-0 | 4 |

## ADVANCED FOUNDATION ENGINEERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Investigate the soil properties by modern investigation methods |
| CO2 | Calculate bearing capacity and settlement of shallow and deep foundation |
| CO3 | Determine the slope stability using various methods |
| CO4 | Analyze the properties of expansive soil for foundation construction. |

### MODULE -I

Modern methods of soil investigations, Geophysical methods; soil resistivity methods seismic refraction method, stress below ground due to loads.

### MODULE -II

Bearing capacity and settlement analysis of shallow foundations: Meyerhof and Hansen's bearing capacity equations, BIS bearing capacity equation, immediate and consolidation settlements in cohesive soil, De-Beer and Schmmertman's methods of settlement prediction in non-cohesive soil.

### MODULE -III

Classification of piles, load carrying capacity of single piles in clay, silt and sand by dynamic and static methods, Pile load test, Pile group, Negative skin friction, Settlement of pile group.

### MODULE – IV

Foundation on expansive soil, Construction on expansive soil, Alteration of soil condition, under-reamed piles. Elements of well foundation, Shape, Depth of scour, well sinking, Tilt, shift and their prevention.

### MODULE -V

Stability of slopes, Limit equilibrium method, Method of slices, Simplified Bishop method, Stability Charts. Soil behavior under dynamic loads, Machine foundation: classification, definitions, design principle in brief, Barken's method.

**Reference Books :-**


1. J. E. Bowles – Analysis and Design of Foundation.
2. V. N. S. Murthy – Soil Mechanics and Foundation Engineering.
3. K. R. Arora – Soil Mechanics & Foundation Engineering.
4. Alam Singh – Modern Geotechnical Engineering.
5. GopalRanjan and A. S. R. Rao – Basic and Applied Soil Mechanics
6. B. M. Das – Foundation Engineering, CENGAGE Learning.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Bridge Engineering | CE704C | PEC | 3-1-0 | 4 |

## BRIDGE ENGINEERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Explain the design procedure of girders and bridges by using various theories |
| CO2 | Calculate various kinds of loads on a bridge |
| CO3 | Design slab, girder, truss and cantilever steel bridges |

**MODULE - I**

Standard Specifications and Code of practice for general requirements of Road Bridges. Design loads for Bridges, IRC loading Standards, Traction Forces and Temperature Effect. General Design requirements. Economic Span of Bridge. Various Types of Bridges.

**MODULE - II**

Design of Solid Slab and Girder Slab Bridges, Courbon's Theory and Pigeaud' Theory for design of Girders and Slabs.

**MODULE - III**

Design of Balanced Cantilever Bridges. Design of Cantilever section, Suspended Span and Articulations.

**MODULE - IV**

Design of Supporting Structures, Piers and Abutments, Solid and Hollow Piers. Single Cellular and Multi Cellular Piers, Design of Bearings. Introduction of Continuous and Arch Bridges.

**MODULE - V**

Steel Bridges subjected to Railway Loading, Truss Bridges, Girder Bridges, Design of Rocker and Roller Bearing.

**Reference Books :-**


1. D. Johnson Victor, *Essentials of Bridge Engineering.*
2. Aswani M.G., Vazirani V.N., Ratwani M.M., *Design of Concrete Bridges.*
3. Ratwani M.M., *Steel Structures Vol. III.*
4. Ponnuswamy S., *Bridge Engineering.*

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Project Management | CE705A | OEC | 3-1-0 | 4 |

## PROJECT MANAGEMENT

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Illustrate formwork, job layout, construction equipments, various types of contracts, various specification of engineering work, assignment models, functional organization |
| CO2 | Analyse a construction project by forming a network/bar chart |
| CO3 | Draft a tender for a constructional project and measurement of a work |

**MODULE-I**

Preliminary and detailed investigation method: Methods of construction, formwork and centering, Schedule of construction, Job layout, Principles of construction management, Modern management techniques like CPM/PERT with network analysis

**MODULE-II**

Construction Equipments: Factors affecting selection, Investment and operating cost, Output of various equipments, Brief study of equipments required for various jobs i.e. Earthwork, Dredging, Conveyance, Concreting, Hoisting, Pile driving, Compaction and Grouting

**MODULE-III**

Contracts: Different types of controls, Notice inviting tenders, Contract document, Departmental method of construction, Rate list, Security deposit and Earnest money, Conditions of contract, Arbitration, Administrative approval, Technical sanction

**MODULE-IV**

Specifications & Public Works Accounts: Importance, Types of specifications, Specifications for various trades of engineering works, Various forms used in construction works, Measurement book, Cash book, Materials at site account, Imprest account, Tools and plants, Various types of running bills, Secured advance, Final bill

**MODULE-V**

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, Various organization charts and manuals, Personnel in construction, Welfare facilities, Labour laws and human relations, Safety engineering, Problem of equipment management, Assignment model, Transportation model and Waiting line modals with their applications, Shovel truck performance with waiting line method

**Reference Books:-**


1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S.Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Computational Methods in Structural Engineering | CE705B | OEC | 3-1-0 | 4 |

## COMPUTATIONAL METHODS IN STRUCTURAL ENGINEERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Apply matrices method (stiffness and flexibility matrices) for different structural elements |
| CO2 | Examine the structures by stiffness matrices method for different loads including temperature, shrinkage, prestressing forces. |
| CO3 | Modify the matrices in order to increase the efficiency for solving time taking computational problems by various methods |
| CO4 | Analyze the continuum structures and two dimensional Isoperimetric elements using finite element concept |

### MODULE - I

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom. Axial, bending, shear and torsional deformations.

Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beam column, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. Non-prismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

### MODULE - II

Basics of the Direct Stiffness method - Analysis of pin-jointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Non-sway)

### MODULE - III

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.

**MODULE - IV**

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalized element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)

**MODULE - V**

Two Dimensional Isoparametric elements, shape functions for Simplex. Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.

**Reference Books:-**

1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach,

Chapman and Hall, New York.

2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishersand Distributors, New Delhi.

3. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.

4. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.

5. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.

6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Environmental Impact Assessment | CE705C | OEC | 3-1-0 | 4 |

## ENVIRONMENTAL IMPACT ASSESSMENT

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Explain the significance of environment impact assessment |
| CO2 | Identify the environmental impact using various methods |
| CO3 | Assess the impact of various environmental agencies and summarize EIA report |
| CO4 | Demonstrate role of public in environmental decision making. |

**MODULE-I**

**Concept of EIA:** Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

**MODULE-II**

**Methods of Impact Identification:** Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

**MODULE-III**

**Impact analysis:** Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

**MODULE-IV**

**Preparation of written documentation:** Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

**MODULE-V**

**Public Participation in Environmental Decision making:** Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

**Reference Books:-**

1. A. K. Srivastav, Environment Impact Assessment, APH Publishing.
2. John Glasson, Riki Therivel & S. Andrew Chadwick " Introduction to EIA" University College London Press Limited.
3. Larry W Canter, " Environment Impact Assessment", McGraw Hill Inc., New York.
4. Ministry of Environment & Forests, Govt. of India 2006 EIA Notification.
5. Rau G J and Wooten C. D, " EIA Analysis Hand Book" McGraw Hill.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Structural Design & Drawing –IV (Steel) | CE801 | PCC | 3-0-2 | 4 |

## STRUCTURAL DESIGN & DRAWING-IV (STEEL)

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Estimate loads on steel structure like girders, bridges, chimneys etc. |
| CO2 | Analyse the steel structures on the basis of estimated loads |
| CO3 | Design plate Girder Bridge, trussed girder bridges and bearings for bridges, steel water tanks, guyed self supporting steel stacks Bunkers, Silos and Towers. |

**MODULE-I**

Plate girder bridges (Riveted and welded)

**MODULE - II**

Trussed girder bridges for railways and highways (RC & IRS holding). Bearings for bridges.

**MODULE - III**

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

**MODULE-IV**

Chimneys: Guyed and self supporting steel stacks.

**MODULE-V**

Bunkers, Silos & Towers.

**Reference Books:-**


**I.** Design of Steel Structures - Ramammutham
2. Design of Steel Structures - Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya& Ajmani
5. Design of steel structures - L.S. Negi


**List of Experiment**

l Design aid drawing of riveted plate girder bridge.
2. Design and drawing of welded plate girder bridge.
3. Design and drawing of truss girder bridge.
4. Self supporting stack design and drawing.
5 .Design and drawing of pressed steel tank/rectangular tank,
6. Design and drawing of hemispherical bottom circular tank.
7. Design and drawing of steel bunker.
8. Design and drawing of steel silo.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B.Tech | Estimating Costing and Tendering | CE802 | PCC | 3-0-2 | 4 |

## ESTIMATING COSTING AND TENDERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Illustrate various type of estimate, their purpose and importance. |
| CO2 | Analyse the rates of important item, material and labour requirement for various trades. |
| CO3 | Prepare detailed estimates of construction works such as building , earth work, water supply, etc. |
| CO4 | Evaluate gross income based on depreciation of property, mortgage and lease problems. |

**MODULE – I**

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**MODULE-II**

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

**MODULE-III**

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

**MODULE-IV**

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

**MODULE-V**

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

**Reference books:-**

1. Hakraborti M "Estimating and Costing" Published by the author 21 B, Bhabananda Road,Calcutta,2002.

2. Dutta B N "Estimating and Costing in Civil Engineering" UBS Publishers' Distributors Ltd., New Delhi, 1999.
3. Birdie G S "Estimating and Costing" Dhanpat Rai & Sons, Delhi,1994.
4. Kohli D. D.,Kohli R.C.,'Estimating and Costing",S.Chand & Company,New Delhi,2004
5.Spence Gedder,"Building and Public Works Administration, Estimating and Costing",Newnes Publishers,London,UK,1950.

**LIST OF EXPERIMENTS**

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Pre-stressed Concrete | CE803A | PEC | 3-0-0 | 4 |

## PRESTRESSED CONCRETE

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Explain different types of pre-stressing systems. |
| CO2 | Analyze different types of prestressed concrete structural members. |
| CO3 | Design pre-stressed concrete simple & continuous beam, slab, column and miscellaneous structural members. |
| CO4 | Calculate pre-stressing losses, short term, long term deflection and crack width. |

**MODULE-I**

Pre-stressing Systems and losses of pre-stressing, introduction various systems of pre-stressing, Types of loss and their analysis.

Working Stress Design of Simple Beams : Critical load conditions allowable stresses, flexural design criteria axially pre-stressed members design of pre-stressing cable for a given cress section, design procedure based on flexure, design by load balancing method and multiple stage pre-stressing.

**MODULE - II**

Continuous Beams : Analysis of two span beam analysis of two span beam with eccentricities at outer supports, continuous beams with variable section design of continuous beam.

Miscellaneous Structural Members : Columns subjected to combined bending and axial force, piles, poles, piers and abutments, Tension members, ring beams circular tanks and pipes pavement sleepers roads and runways.

**MODULE - III :** Limit State Design of Beams : Limit state of strength in flexure, shear and torsion permissible stresses limit state of serviceability against deflection. Cracking and durability, design of simply supported and continuous beams.

**MODULE - IV**

Bond and Anchorage of Pre-stressing cables Bond in pre tensioned and post tensioned construction, prestressing cable at centroid axis symmetric multiple cables causing axial thrust cable with eccentricity,

inclined pre-stressing cable spanning stress, end zone reinforcement.

**MODULE-V**

Pre-stressed Concrete Slabs : One way slab two way slabs, pre-stressed concrete beam slab construction, pre-stressed flat slab.

Deflection and Crack Width : Factors influencing deflection, short term deflections of un cracked members, long term deflection deflections of cracked members. Estimation of crack width using British code and FIP recommendations.

**Reference Books:**

l. N.Krishna Raju, Pre-stressed Concrete, Tata Mc Graw Hill Book Co.
2. P. Dayaratran, Pre-stressed Concrete Structures, Oxford & IBH Co. Delhi.
3.Jain & Jai Krishna, Plain & Reinforced Concrete Vol - II Nem chand & Bros Roorkee.
4. IS 1343-980 code of Practice for Pre-stressed Concrete Bureau of India Standards New Delhi.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Pavement Design | CE803B | PEC | 3-0-0 | 4 |

## PAVEMENT DESIGN

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Calculate ESWL, repetition of load and their effects on pavement structures |
| CO2 | Determine stresses in flexible and rigid pavements. |
| CO3 | Design rigid pavements as per IRC methods, PCA Chart methods and AASHTO methods. |
| CO4 | Evaluate and strengthen existing pavement by Benkleman beam method and serviceability index method |

**MODULE -I**

Equivalent Single Wheel Load (ESWL) : Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.

**MODULE -II**

Flexible Pavements : Component parts of the pavement structures and their firnctions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

**MODULE -III**

Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stesses, critical loading positions.

**MODULE -IV**

Rigid pavement design : IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.

**MODULE -V**

Evaluation and Stengthening of Existing Pavements : Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures.

**Reference Books :--**

l. Principles of pavement design by E.J.Yoder & M.W. Witczak

2. AASTHO, "A'r{SHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidlines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction.
5 Srinivasan M. "Modern Permanent Way".

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Traffic Engineering | CE803C | PEC | 3-0-0 | 4 |

## TRAFFIC ENGINEERING

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Illustrate traffic characteristics, its impact on road traffic, various problems on mass transportation and road accidents |
| CO2 | Practice different traffic studies and give its practical significance |
| CO3 | Design different traffic signal system, traffic islands and street lighting |

**MODULE -I**

Traffic Characteristics: (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions.

weight, power, speed and braking capacity of a vehicle.

**MODULE -II**

Traffic Studies: (i) Spot Speed Studies and Volume Studies.(ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O & D): Various methods, collection and interpretation of data, planning and sampling. (iv)Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

**MODULE -III**

Traffic Operations and Control: (i) Traffic regulations and various means of control.(ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

**MODULE -IV**

Street Lighting: (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

**MODULE -V**

Accident Studies & Mass Transportation: (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

**Reference Books :-**


1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S.Smith& F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R.Drew, Traffic Flaw Theory
5. W.R. Mchsne and R.P. Roess "Traffic Engg"
6. Wohl& Martin, Traffic System Analysis for Engineering & Planners

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | Air Quality Monitoring & Control | CE804B | OEC | 3-0-0 | 4 |

## AIR QUALITY MONITORING & CONTROL

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Identify the sources of air pollution. |
| CO2 | Relate general diseases and toxicity of pollutants. |
| CO3 | Explain the design and operation of various air pollution control equipments. |
| CO4 | Apply air pollution control legislation, public education pollution standards, etc. to practice. |

**MODULE- I**

Air-pollution : Definition, Atmosphere and global effects, Pollutants and their sources, classification. Air Pollution Meteorology : Interaction of Meteorology parameters, Transport and Diffusion Models and mechanism, Wind rose diagram, Particulates Visibility. Dynamics of pollutant dispersion and disposal. Effects on environment including living and non-living matter.

**MODULE- II**

Air Pollutant Chemistry: Properties of Pollutant, Units for expression of concentrations, Effects on Vegetation, Physical Environment and Human Health Mechanisms of Effect, Estimation Methodology. Human Health Hazard: Units of Measurement, Measurement of Concentration on Human Health. Nature of process Emissions: Mobile Combustion. Sources, Stationary Source, Measurement of Monitoring.

**MODULE- III**

Ambient air quality monitoring techniques: Air pollution indices, standards, norms, rules and regulations. Removal processes. An introduction to air pollution meteorology. Air Laboratory - High Volume Sampling, Handy Sampling, Bio aerosols sampling, Indoor Air Sampling, Stack Sampling.

**MODULE- IV**

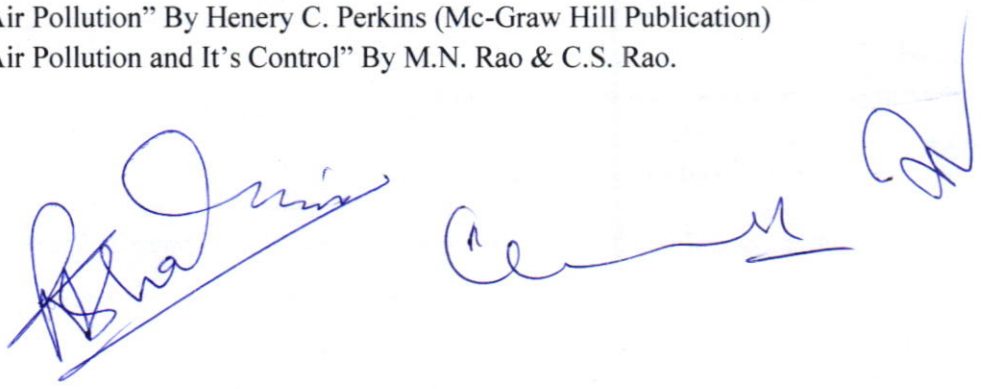
Prevention and Control of Air Pollution: Regulated Release of Air Pollutant Practicability, Mechanisms of Control, Equipment Mathematical Model of Control Processes, Mechanical Collectors, Wet Collectors, Filtration, Electrostatics Precipitators Of Form Bed Reactors and Ventury Scrubbers, After Burners And Dispersion. Industrial Application: Wood Working Operation, Open Hearth Neel Making, Manufacture of Sulfuric Acid, Coffee Roasting, Environmental Industrial Location, Theories And Facilities, Impact of Industrial Products.

**MODULE- V**

Legislation : Standards of Air Qualities in Various Countries , Evolution of Standards, Standards and Criteria, Emission Standards and Air Qualities Standards, Clean Air Act, Total Environmental Protection, Social Responsibility, Economics and Production..

**Reference Books :**


1. "Air Pollution : It's Origin and Control" By Kenneth Wark & Cecil F. Warner.
2. "Air Pollution Control Volume (I to VII)" By A.C. Stern.
3. "Air Pollution" By Henery C. Perkins (Mc-Graw Hill Publication)
4. "Air Pollution and It's Control" By M.N. Rao & C.S. Rao.

| Course | Subject Title | Subject Code | Category Code | Hours/week | Total Credits |
|---|---|---|---|---|---|
| B. Tech | FRP Composites | CE804C | OEC | 3-0-0 | 4 |

## FRP COMPOSITES

**Course Outcomes-**

After the completion of this course student will be able to-

| | |
|---|---|
| CO1 | Illustrate selection criteria for materials selection. |
| CO2 | Choose different types of fibre for FRP composites. |
| CO3 | Explain types of molds and manufacturing processes. |

### MODULE-I

Introduction- Composites- Advantages of FRP –Role of resin and reinforcements - Applications of FRP. Designing in FRP – Selection criteria - material and process selection

### MODULE-II

Molds for FRP- Polyester resins. Introduction – Plaster mold, wooden Mold - GRP molds- Epoxide moldsSteel molds- Aluminum alloy molds- Nickel shell molds.

### MODULE-III

Reinforcements- Introduction - Surfacing tissue –Glass fiber - Continuous filament rovings- Chopped strands- Chopped strand mats- Continuous strand mat Woven glass fabrics- Carbon fiber- Aromatic polyamide (aramid) fibers - Polyester fibers- Polyacrylonitrile fibers - Nylon - PVC and PVDC Cotton – Sisal - Asbestos– Jute- Boron fibers

### MODULE-IV

Molding Processes- Introduction - Contact molding -hand lay up - Spray lay-up- Vacuum bag molding - Pressure bag molding – Resin transfer or resin injection molding-pressure injection- Vacuum impregnation and injection - Hot press/matched metal molding - Filament winding- Centrifugal molding - Continuous sheet manufacture – Pultrusion - Sandwich construction.

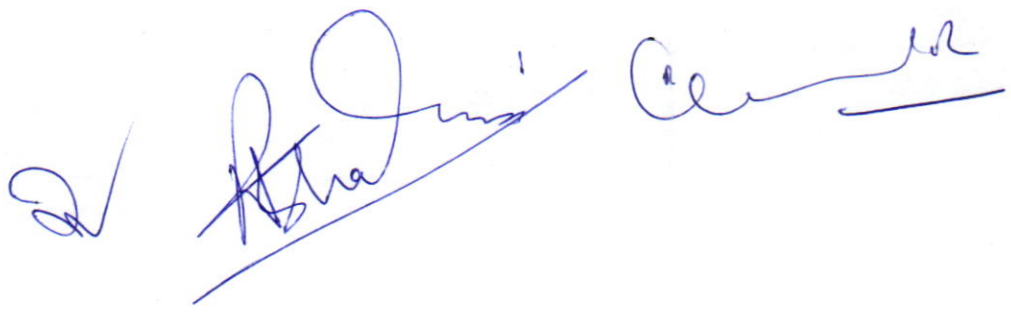
### MODULE-V

Bulk, Dough and Sheet molding Compounds and Prepregs. Introduction- Dough and bulk molding compounds - Sheet mould compounds- manufacture of SMC- Prepregs - Commercial products.

Reference Books:

1. FRP TECHNOLOGY by Weatherhead.

2. FIBERREINFORCED COMPOSITES- Materials, Manufacturing, and Design by P.K. Mallick
3. COMPOSITES MANUFACTURING- Materials, Product, and Process Engineering by Sanjay K. Mazumdar
4. Hand book of Reinforcement for plastics – Milewski .
5. M O W Richardson "Polymer Engineering Composite" – Applied Science.



**Jabalpur Engineering College, Jabalpur**
**(Credit Based Grading System based scheme)**
**Bachelor of Engineering (CBGS) Semester: VII (Civil Engineering)**
**(w.e.f. July 2018)**

| Course | Subject Title | Subject Code | Hours/week | Total Credits |
|---|---|---|---|---|
| B.E. | Transportation Engg.-II | CE-7003 | 3-1-2 | 6 |

## TRANSPORTATION ENGINEERING-II

### UNIT-I

**High way planning, Alignment & Geometric Design**: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engineering Surveys for highway location. Cross sectional elements . width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

### UNIT-II

**Bituminous & Cement Concrete payments**: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatmert. seal coat, tack coat, prime coat, wearing coats disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

### UNIT-III

**Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning**: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads- types, specifications, construction, maintenance and causes of failures.

**Surface and sub-surface drainage, highway materials**: Properties and testing etc. Channelised and unchannelised intersections, at grade & grade separated interections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation trip distribution, model split, traffic assignment, plan preparation.

### UNIT-IV

**Airport Planning, Runway & Taxiway**: Airport site selection. Air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports. Geometrical elements : Taxi ways and runways, pattern of runway capacity.

### UNIT-V

Airport, Obstructions, Lightning and Traffic Control :Zoningregulations, approach area, approach surface imaginary, conical horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental lending system, precision approach radar, VOR enroute traffic control.

**Reference Books:**


1. Highway Engineering by S.K.Khanna& C.E.G. Justo
2. Airport Planning & Design by S.K.Khanna& M.G. arora

**COURSE OUTCOMES (COs)**

**After completion of this course the students will be able to**

1. Calculate various geometrical elements of highway
2. Design signals and different types of flexible and rigid pavement.
3. Illustrate principles of construction and maintenance of low cost roads, road intersections and traffic marking.
4. Discuss highway planning, airport site selection, basic runway and taxiway elements, and aiport regulatory

**List of Experiments:**

1. Impact Test of Aggregates.
2. Abrasion Test of Aggregates.
3. Shape test – Elongation and Flakiness Index Test of Aggregates.
4. Penetration Test of Bitumen
5. Softening point Test of Bitumen
6. Ductility test of Bitumen
7. Crushing strength of Aggregate
8. Bituminous mix design by marshal method
9. Specific gravity and water absorption of aggregate
10. CBR of soil sub grade.

**COURSE OUTCOMES (COs)**

**After completion of this course the students will be able to**

1. Perform various tests like impact test, crushing strength test, shape test, specific gravity test, water absorption test on aggregate.
2. Perform various test like softening point test, ductility test, penetration test on bitumen and CBR test on soil subgrade.
3. Perform bituminous mix design using marshal method.