### **Department of Civil Engineering**

#### 2.6.1 Program Outcomes and Course Outcomes

| Program Outcomes (POs)  |
|---|
| <b>PO1:</b> Apply knowledge of computing fundamentals, computing specialization, mathematics and domain knowledge to provide IT solutions.                  |
| <b>PO2:</b> Identify, analyse and solve IT problems using fundamental principles of mathematics and computing sciences.                                     |
| <b>PO3:</b> Design, Develop and evaluate software solutions to meet societal and environmentalconcerns.   |
| <b>PO4:</b> Conduct investigations of complex problems using research based knowledge and methods to provide valid conclusions.                             |
| <b>PO5:</b> Select and apply appropriate techniques and modern tools for complex computingactivities.   |
| <b>PO6:</b> Practice and follow professional ethics and cyber regulations.  |
| <b>PO7:</b> Involve in life-long learning for continual development as an IT professional.  |
| <b>PO8:</b> Apply and demonstrate computing and management principles to manage projects in multidisciplinary environments by involving in different roles. |
| PO9:Comprehend& write effective reports and make quality presentations.   |
| PO10:Understand and assess the impact of IT solutions on socio-environmental issues.  |

**PO11:**Work collaboratively as a member or leader in multidisciplinary teams.

**PO12:**Identify potential business opportunities and innovate to create value to the society and seize that opportunity.

### **Program Specific Outcomes (PSOs)**

**PSO1::**Graduates will be proficient in problem identification, formulation, analysis, design, execution, optimization of cost, time, quality and safety using appropriate tools in the area of civil engineering

PSO2:Graduates will be responsible towards the society with solutions to various civil engineering problems focusing on sustainable development upholding principles of management and professional ethics.

## **Course Outcomes:**

|          | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester | Scheme of Study: 18-Scheme        |
|----------|--|-----------------------------------|
|          | Course Name : Calculus And Linear Algebra                      | Course Code: 18MATI1              |
| CO1      | Apply the knowledge of calculus to solve problems              | related to polar curves and its   |
| 001      | applications in determining the bendiness of a curve.          |                                   |
| $CO^{2}$ | Learn the notion of partial differentiation to calculate       | e rates of change of multivariate |
| 02       | functions and solve problems related to composite func         | tions and Jacobians.              |
| CO3      | Apply the concept of change of order of integration a          | nd variables to evaluate multiple |
| 005      | integrals and their usage in computing the area and volu       | imes.                             |
| CO4      | Solve first order linear/nonlinear differential equat          | ion analytically using standard   |
| C04      | methods  |                                   |
| COS      | Make use of matrix theory for solving system of                | linear equations and compute      |
| 005      | eigenvalues and eigenvectors required for matrix diago         | nalization process.               |

|      | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester                             | Scheme of Study: 18-Scheme              |
|------|--|---|
| CC   | URSE NAME : ENGINEERING CHEMISTRY  | Course Code: 18CHE12                    |
|      | Use of free energy in equilibria, rationalize bulk   | properties and processes using          |
| CO1  | thermodynamic considerations, electrochemical  |   |
|      | energy systems   |   |
|      | Causes & effects of corrosion of metals and control  | ol of corrosion. Modification of        |
| CO2  | surface properties of metals to develop resistance to corrosion, wear, tear impact etc. by |   |
|      | electroplating and electroless plating.  |   |
|      | Production & consumption of energy for industria   | alization of country and living         |
| CO3  | standards of people. Electrochemical and concent   | ration cells. Classical, modem          |
|      | batteries and fuel cells. Utilization of solar energy for d                                | ifferent useful forms of energy.        |
| CO4  | Environmental pollution, waste management and water  | chemistry.                              |
|      | Different to be increased in the next state of and   | having Free demonstral and a similar of |
| CO5  | Different techniques of instrumental methods of ana.                                       | lysis. Fundamental principles of        |
| 2.50 | nano materials.  |   |

|   | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester | Scheme of Study: 18-Scheme       |
|---|--|----------------------------------|
| Course Name : C PROGRAMMING FOR PROBLEM |  | Course Code: 18CPS13             |
|   | SOLVING  |                                  |
| CO1                                     | Illustrate simple algorithms from the different domains suc    | ch as mathematics, physics, etc. |
| CO2                                     | Construct a programming solution to the given problem u        | sing C. Identify and correct the |
| 02                                      | syntax and logical errors in C programs. Modularize the        | given problem using functions    |

|     | and structures.  |
|-----|--|
| CO3 | Illustrate simple algorithms from the different domains such as mathematics, physics, etc. |
|     | Construct a programming solution to the given problem using C. Identify and correct the    |
| CO4 | syntax and logical errors in C programs. Modularize the given problem using functions      |
|     | and structures.  |
| CO5 | Illustrate simple algorithms from the different domains such as mathematics, physics, etc. |

|     | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester                                       | Scheme of Study: 18-Scheme                |
|-----|--|---|
|     | COURSE NAME : BASIC ELECTRONICS  | Course Code: 18ELN14                      |
| CO1 | Describe the operation of diodes, BJT, FET and Ope   | rational Amplifiers.                      |
| CO2 | 2 Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.         |   |
| CO3 | Describe general operating principles of SCRs and its application.                                   |   |
| CO4 | Explain the working and design of Fixed voltage I oscillator using Timer IC 555.                     | C regulator using 7805 and Astable        |
| CO5 | Explain the different number system and their combinational and sequential logic circuits using Flip | conversions and construct simple p-Flops. |
| CO6 | Describe the basic principle of operation of commun  | ication system and mobile phones.         |

|     | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester        | Scheme of Study: 18-Scheme          |
|-----|---|-------------------------------------|
| COU | RSE NAME : ELEMENTS OF MECHANICAL<br>ENGINEERING                      | Course Code: 18ME15                 |
| CO1 | Identify different sources of energy and their conver                 | rsion process.                      |
| CO2 | Explain the working principle of hydraulic to refrigeration.          | urbines, pumps, IC engines and      |
| CO3 | Recognize various metal joining processes and power                   | er transmission elements.           |
| CO4 | Understand the properties of common engineering engineering industry. | materials and their applications in |
| CO5 | Discuss the working of conventional machine too accessories.          | ls, machining processes, tools and  |

|     | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester | Scheme of Study: 18-Scheme             |
|-----|--|--|
| Co  | ourse Name : ENGINEERING CHEMISTRY                             | Course Code: 18CHEI 16                 |
|     | LABORATORY   | Course Code: 18CHEL10                  |
| CO1 | Handling different types of instruments for analys             | is of materials using small quantities |
| COI | of materials involved for quick and accurate results           |  |
| CO2 | Carrying out different types of titrations for estimation      | ation of concerned in materials using  |

comparatively more quantities of materials involved for good results.

|      | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester     | Scheme of Study: 18-Scheme     |
|------|--|--------------------------------|
| Cour | se Name : C PROGRAMMING LABORATORY                                 | Course Code: 18CPL17           |
| CO1  | Write flowcharts, algorithms and programs.                         |                                |
| CO2  | Familiarize the processes of debugging and exprogramming language. | xecution. Implement basics ofC |
| CO3  | Illustrate solutions to the laboratory programs.                   |                                |

|     | Year/ Semester: 1 <sup>st</sup> Year /1 <sup>st</sup> Semester   | Scheme of Study: 18-Scheme           |
|-----|--|--------------------------------------|
|     | Course Name : TECHNICAL ENGLISH - I                              | Course Code: 18EGH18                 |
| CO1 | Use grammatical English and essentials of language               | e skills and identify the nuances of |
| COI | phonetics, intonation and flawless pronunciation                 |                                      |
| CO2 | Implement English vocabulary at command and language proficiency |                                      |
| CO3 | Identify common errors in spoken and written communication       |                                      |
| CO4 | Understand and improve the non verbal communication and kinesics |                                      |
| CO5 | Perform well in campus recruitment, engineering and              | all other general                    |

|                         | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                 | Scheme of Study: 18-Scheme       |
|-------------------------|--|----------------------------------|
| CO                      | URSE NAME : ADVANCED CALCULUS AND<br>NUMERICAL METHODS                         | Course Code: 18MAT21             |
| CO1                     | Illustrate the applications of multivariate calculus t                         | o understand the solenoidal and  |
| COI                     | integrals.   | ence of line, surface and volume |
| $CO^{2}$                | Demonstrate various physical models through higher order differential equation |                                  |
| 02                      | solve such linear ordinary differential equations.                             |                                  |
| CO2                     | Construct a variety of partial differential equ                                | ations and solution by exact     |
| COS                     | methods/method of separation of variables.                                     |                                  |
| CO4                     | Explain the applications of infinite series and ob                             | tain series solution of ordinary |
| differential equations. |  |                                  |
| CO5                     | Apply the knowledge of numerical methods in the n                              | nodeling of various physical and |
| 005                     | engineering phenomena.   |                                  |

|     | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                         | Scheme of Study: 18-Scheme          |
|-----|--|-------------------------------------|
|     | Course Name : : ENGINEERING PHYSICS  | Course Code: 18PHY22                |
| CO1 | Understand various types of oscillations and their im                                  | plications, the role of Shock waves |
| COI | applications.  | thes of materials for engineering   |
| CO2 | Realize the interrelation between time varying electron                                | ctric field and magnetic field, the |
| 02  | transverse nature of the EM waves and their role in op                                 | ptical fiber communication.         |
| CO2 | Compute Eigen values, Eigen functions, momentum  | of Atomic and subatomic particles   |
| COS | using Time independent 1-D Schrodinger's wave equa                                     | ation.                              |
| CO4 | Apprehend theoretical background of laser, construction and working of different types |                                     |
| C04 | of laser and its applications in different fields                                      |                                     |
| COS | Understand various electrical and thermal propert                                      | ies of materials like conductors,   |
| COS | semiconductors and dielectrics using different theorem                                 | tical models.                       |

|      | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                       | Scheme of Study: 18-Scheme |
|------|--|----------------------------|
| Cour | se Name : BASIC ELECTRICAL ENGINEERING   | Course Code: 18ELE23       |
| CO1  | Analyze D.C and A.C circuits.  |                            |
| CO2  | Explain the principle of operation and construction of single phase transformers.    |                            |
| CO3  | Explain the principle of operation and construction of DC machines and synchronous   |                            |
| 005  | machines.  |                            |
| CO4  | Explain the principle of operation and construction of three phase induction motors. |                            |
| CO5  | Discuss concepts of electrical wiring, circuit protecting devices and earthing.      |                            |

|     | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                          | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name : ELEMENTS OF   | Course Code: 18CIV24       |
|     | CIVIL ENGINEERING AND MECHANICS   |                            |
| CO1 | Mention the applications of various fields of Civil Engineering.                        |                            |
| CO2 | Compute the resultant of given force system subjected to various loads.                 |                            |
| CO3 | Comprehend the action of Forces, Moments and other loads on systems of rigid bodies     |                            |
| 005 | and compute the reactive forces that develop as a result of the external loads.         |                            |
| CO4 | Locate the Centroid and compute the Moment of Inertia of regular and built-up sections. |                            |
| CO5 | Express the relationship between the motion of bodies and analyze the bodies in motion. |                            |

|     | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                       | Scheme of Study: 18-Scheme        |
|-----|--|-----------------------------------|
|     | Course Name : ENGINEERING GRAPHICS   | Course Code: 18EGDL25             |
| CO1 | Prepare engineering drawings as per BIS conventions mentioned in the relevant codes. |                                   |
| CO2 | Produce computer generated drawings using CAD software.                              |                                   |
| CO3 | Use the knowledge of orthographic projections to re-                                 | epresent engineering information/ |
| 005 | concepts and present the same in the form of drawings.                               |                                   |
| CO4 | Develop isometric drawings of simple objects readin                                  | g the orthographic projections of |
| 04  | those objects.   |                                   |
| CO5 | Convert pictorial and isometric views of simple object                               | s to orthographic views.          |

|          | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                       | Scheme of Study: 18-Scheme       |
|----------|--|----------------------------------|
|          | Course Name : ENGINEERING PHYSICS  | Course Code: 180HVI 26           |
|          | LABORATORY   | Course Coue. 1811111220          |
| CO1      | Apprehend the concepts of interference oflight, diffraction of light, Fermi energy a |                                  |
| COI      | magnetic effect of current   |                                  |
| $CO^{2}$ | Understand the principles of operations of optical fibers and semiconductor devices  |                                  |
| 02       | such as Photodiode, and NPN transistor using simple circuits                         |                                  |
| CO3      | Determine elastic moduli and moment of inertia of g                                  | given materials with the help of |
| 005      | suggested procedures   |                                  |
| CO4      | Recognize the resonance concept and its practical applications                       |                                  |
| CO5      | Understand the importance of measurement pro   | cedure, honest recording and     |
| 005      | representing the data, reproduction of final results                                 |                                  |

|      | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                                       | Scheme of Study: 18-Scheme    |
|------|--|-------------------------------|
| Cour | se Name : BASIC ELECTRICAL ENGINEERING<br>LABORATORY   | Course Code: 18ELEL27         |
| CO1  | Identify the common electrical components and m conducting experiments in the electrical laboratory. | easuring instruments used for |
| CO2  | Compare power factor of lamps.   |                               |
| CO3  | Determine impedance of an electrical circuit and power consumed in a 3 phase load.                   |                               |
| CO4  | Determine earth resistance and understand two way and three way control of lamps.                    |                               |
| CO5  | Identify the common electrical components and m conducting experiments in the electrical laboratory. | easuring instruments used for |

|     | Year/ Semester: 1 <sup>st</sup> year /2 <sup>nd</sup> semester                    | Scheme of Study: 18-Scheme       |
|-----|---|----------------------------------|
|     | Course Name : TECHNICAL ENGLISH - II  | Course Code: 18EGH28             |
| CO1 | Identify common errors in spoken and written communication                        |                                  |
| CO2 | Get familiarized with English vocabulary and language proficiency                 |                                  |
| CO3 | Improve nature and style of sensible writing and acquire employment and workplace |                                  |
| 005 | communication skills  |                                  |
| CO4 | Improve their Technical Communication Skills through                              | h Technical Reading and Writing  |
| 04  | practices   |                                  |
| CO5 | Perform well in campus recruitment, engineering ar                                | nd all other general competitive |
| 005 | examinations  |                                  |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester   | Scheme of Study: 18-Scheme   |
|-----|--|--|
| Cou | rse Name :TRANSFORM CALCULUS, FOURIER<br>SERIES AND NUMERICAL TECHNIQUES   | Course Code: 18MAT31   |
| CO1 | Use Laplace transform and inverse Laplace transform<br>equation arising in network analysis, control<br>engineering  | in solving differential/ integral<br>l systems and other fields of |
| CO2 | Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory. |  |
| CO3 | Make use of Fourier transform and Z-transform t<br>function arising in wave and heat propagation, si   | o illustrate discrete/continuous gnals and systems.                |
| CO4 | Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.                      |  |
| CO5 | Determine the externals of functional using calculus o<br>arising in dynamics of rigid bodies and vibration  | f variations and solve problems al analysis.                       |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :STRENGTH OF MATERIALS   | Course Code:18CV32         |
| CO1 | To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements.              |                            |
| CO2 | To evaluate the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements. |                            |
| CO3 | To analyse different internal forces and stresses induced due to representative loads on structural elements.                        |                            |
| CO4 | To evaluate slope and deflections of beams.  |                            |
| CO5 | To evaluate the behaviour of torsion members, columns  | and struts.                |

|                                      | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester                                     | Scheme of Study: 18-Scheme |
|--------------------------------------|--|----------------------------|
| Course Name :FLUIDS MECHANICS Course |  | Course Code: 18CV33        |
| CO1                                  | Possess a sound knowledge of fundamental properties of fluids and fluid Continuum                  |                            |
| CO2                                  | Apply principles of mathematics to represent kinematic concepts related to fluid flow              |                            |
| CO3                                  | Apply principles of mathematics to represent kinematic concepts related to fluid flow.             |                            |
| CO4                                  | Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications |                            |
| CO5                                  | Compute the discharge through pipes and over notches a   | and weirs.                 |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester                  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name :BUILDING MATERIALS AND<br>CONSTRUCTION                             | Course Code: 18CV34        |
| CO1 | Select suitable materials for buildings and adopt suitable                      | e construction techniques  |
| CO2 | Decide suitable type of foundation based on soil parameters                     |                            |
| CO3 | Supervise the construction of different building elements based on suitability. |                            |
| CO4 | Exhibit the knowledge of building finishes and form work requirements           |                            |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester  | Scheme of Study: 18-Scheme       |
|-----|---|----------------------------------|
|     | Course Name :BASIC SURVEYING  | Course Code: 18CV35              |
| CO1 | Posses a sound knowledge of fundamental principles Geodetics  |                                  |
| CO2 | Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems. |                                  |
| CO3 | Capture geodetic data to process and perform analysis for survey problems]  |                                  |
| CO4 | Analyse the obtained spatial data and compute areas as plane figures as contours  | nd volumes. Represent 3D data on |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester  | Scheme of Study: 18-<br>Scheme |
|-----|---|--------------------------------|
|     | Course Name :ENGINEERING GEOLOGY  | Course Code: 18CV36            |
| CO1 | Apply geological knowledge in different civil engineering practice.   |                                |
| CO2 | Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials              |                                |
| CO3 | Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct.                                 |                                |
| CO4 | Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems |                                |
| CO5 | Intelligent enough to apply GIS, GPS and remote sensing civil engineering construction.   | as a latest tool in different  |

|   | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester                               | Scheme of Study: 18-Scheme |
|---|--|----------------------------|
| Course Name :COMPUTER AIDED BUILDING PLANNING<br>ANDDRAWING |  | Course Code: 18CVL37       |
| CO1   | D1 Prepare, read and interpret the drawings in a professional set up.                        |                            |
| CO2   | D2 KnowtheproceduresofsubmissionofdrawingsandDevelopworkingandsubmissiondrawingsforbuilding. |                            |
| CO3   | Plananddesignaresidentialorpublicbuildingasperthegivenrequirements.                          |                            |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester  | Scheme of Study: 18-Scheme                 |
|-----|---|--|
| Cou | arse Name :BUILDING MATERIALS TESTING<br>LABORATORY   | Course Code: 18CVL38                       |
| CO1 | Reproduce the basic knowledge of mathematics and en<br>in tension,<br>compression, shear and torsion.                               | gineering in finding the strength          |
| CO2 | Identify, formulate and solve engineering problems of structural elements subjected to flexure.                                     |  |
| CO3 | Evaluate the impact of engineering solutions on the soc<br>contemporary<br>issues regarding failure of structures due to unsuitable | eiety and also will be aware of materials. |

|     | Year/ Semester: 2 <sup>nd</sup> Year /3 <sup>rd</sup> Semester                                 | Scheme of Study: 18-Scheme      |  |
|-----|--|---------------------------------|--|
| Co  | Course Name : ADDITIONAL MATHEMATICS – I Course Code: 18MATDIP31                               |                                 |  |
| CO1 | Apply concepts of complex numbers and vector algebra<br>in<br>related area.                    | to analyze the problems arising |  |
| CO2 | Use derivatives and partial derivatives to calculate rate of change of multivariate functions. |                                 |  |
| CO3 | Analyze position, velocity and acceleration in two and to<br>valued<br>functions               | three dimensions of vector      |  |
| CO4 | Learn techniques of integration including the evaluation                                       | of double and triple integrals. |  |
| CO5 | Identify and solve first order ordinary differential equation                                  | ions                            |  |

|      | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme      |  |
|------|--|---------------------------------|--|
| Cour | Course Name :COMPLEX ANALYSIS, PROBABILITY<br>AND STATISTICAL METHODS Course Code: 18MAT41   |                                 |  |
| CO1  | Use the concepts of analytic function and complex poter<br>arising in<br>electromagnetic field theory.                                 | ntials to solve the problems    |  |
| CO2  | Utilize conformal transformation and complex integral arising in aerofoil theory, fluid<br>flow<br>visualization and image processing. |                                 |  |
| CO3  | Apply discrete and continuous probability distributions in analyzing the probability<br>models<br>arising in engineering field         |                                 |  |
| CO4  | Make use of the correlation and regression analysis to fi<br>for the statistical data  | t a suitable mathematical model |  |
| CO5  | Construct joint probability distributions and demonstrate hypothesis.  | e the validity of testing the   |  |

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| C   | Course Name :ANALYSIS OF DETERMINATE<br>STRUCTURES   | Course Code: 18CV42        |
| CO1 | 1 Identify different forms of structural systems   |                            |
| CO2 | Construct ILD and analyse the beams and trusses subjected to moving loads  |                            |
| CO3 | Understand the energy principles and energy theorems and its applications to determine<br>the<br>deflections of trusses and beams. |                            |

| CO4 Determine the stress resultants in arches a | and cal | bles |
|---|---------|------|
|---|---------|------|

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme    |  |
|-----|---|-------------------------------|--|
|     | Course Name : APPLIED HYDRAULICS Course Code: 18CV43  |                               |  |
| CO1 | Apply dimensional analysis to develop mathematical mo<br>parametric<br>values in prototype by analyzing the corresponding mod | odeling and compute the       |  |
| CO2 | Design the open channels of various cross sections including economical channel sections                                      |                               |  |
| CO3 | Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,   |                               |  |
| CO4 | Compute water surface profiles at different conditions  |                               |  |
| CO5 | Design turbines for the given data, and to know their op<br>different<br>operating conditions                                 | eration characteristics under |  |

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :CONCRETE TECHNOLOGY   | Course Code: 18CV44        |
| CO1 | Relate material characteristics and their influence on mid   | crostructure of concrete   |
| CO2 | Distinguish concrete behavior based on its fresh and hardened properties.  |                            |
| CO3 | Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes. |                            |
| CO4 | Adopt suitable concreting methods to place the concrete based on requirement.  |                            |
| CO5 | Select a suitable type of concrete based on specific appli   | ication                    |

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme      |
|-----|--|---------------------------------|
|     | Course Name : ADVANCED SURVEYING   | Course Code: 18CV45             |
| CO1 | Apply the knowledge of geometric principles to arrive at surveying problems                                |                                 |
| CO2 | Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems |                                 |
| CO3 | Capture geodetic data to process and perform analysis for of electronic instruments                        | or survey problems with the use |

| CO4 | Design and implement the | different types of curves f | for deviating type of alignments. |
|-----|--------------------------|-----------------------------|-----------------------------------|
|-----|--------------------------|-----------------------------|-----------------------------------|

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme        |
|-----|---|-----------------------------------|
|     | COURSE NAME :WATER SUPPLY AND<br>TREATMENT ENGINEERING  | Course Code: 18CV46               |
| CO1 | D1 Estimate average and peak water demand for a community   |                                   |
| CO2 | Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community |                                   |
| CO3 | Evaluate water quality and environmental significance of various parameters and plan suitable treatment system    |                                   |
| CO4 | Design a comprehensive water treatment and distributio water to the required quality standards.                   | n system to purify and distribute |

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name :ENGINEERING GEOLOGY<br>LABORATORY  | Course Code: 18CVL47       |
| CO1 | The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.  |                            |
| CO2 | The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.                                |                            |
| CO3 | The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods. |                            |
| CO4 | The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.    |                            |
| CO5 | The students will be able to identify the different structures in the field.  |                            |

|       | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester        | Scheme of Study: 18-Scheme  |
|-------|---|-----------------------------|
| Cours | e name :FLUID MECHANICS AND HYDRAULIC<br>MACHINES LABORATORY          | Course Code: 18CVL48        |
| CO1   | Properties of fluids and the use of various instruments               | for fluid flow measurement. |
| CO2   | Working of hydraulic machines under various conditio characteristics. | ns of working and their     |

|     | Year/ Semester: 2 <sup>nd</sup> Year /4 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme    |
|-----|---|-------------------------------|
| Cou | Irse Name : ADDITIONAL MATHEMATICS – II                         | Course Code: 18MATDIP41       |
| CO1 | Solve systems of linear equations using matrix algebra.         |                               |
| CO2 | Apply the knowledge of numerical methods in modelling problems. | ng and solving of engineering |
| CO3 | Apply the knowledge of numerical methods in modellin problems.  | ng and solving of engineering |
| CO4 | Classify partial differential equations and solve them by       | y exact methods.              |
| CO5 | Apply elementary probability theory and solve related           | problems                      |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme        |
|-----|---|-----------------------------------|
| Cou | rse Name :CONSTRUCTION MANAGEMENT AND<br>ENTREPRENEURSHIP   | Course Code: 18CV51               |
| CO1 | Prepare a project plan based on requirements and prepa<br>understanding the activities and their sequence           | re schedule of a project by       |
| CO2 | Understand labour output, equipment efficiency to allo<br>activity / project to achieve desired quality and safety. | cate resources required for an    |
| CO3 | Analyze the economics of alternatives and evaluate ber<br>construction activity based on monetary value and time    | efits and profits of a value.     |
| CO4 | Establish as an ethical entrepreneur and establish an enoffered by the federal agencies.                            | terprise utilizing the provisions |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme      |
|-----|---|---------------------------------|
| Co  | urse Name :ANALYSIS OF INDETERMINATE<br>STRUCTURES  | Course Code:18CV52              |
| CO1 | Determine the moment in indeterminate beams and framinertia and subsidence using slope defection method | nes having variable moment of   |
| CO2 | Determine the moment in indeterminate beams and frammement distribution method.                         | nes of no sway and sway using   |
| CO3 | Construct the bending moment diagram for beams and  | frames by Kani's method         |
| CO4 | Construct the bending moment diagram for beams and  | frames using flexibility method |
| CO5 | Analyze the beams and indeterminate frames by system  | n stiffness method.             |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester                     | Scheme of Study: 18-Scheme    |
|-----|--|-------------------------------|
| 0   | Course Name :DESIGN OF RC STRUCTURAL<br>ELEMENTS                                   | Course Code:18CV53            |
| CO1 | Understand the design philosophy and principles.                                   |                               |
| CO2 | Solve engineering problems of RC elements subjected to                             | o flexure, shear and torsion  |
| CO3 | Demonstrate the procedural knowledge in designs of RC slabs, columns and footings. | C structural elements such as |
| CO4 | Owns professional and ethical responsibility                                       |                               |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme                   |
|-----|---|--|
|     | Course Name :BASIC GEOTECHNICAL<br>ENGINEERING  | Course Code:18CV54                           |
| CO1 | Ability to plan and execute geotechnical site investigation engineering projects  | on program for different civil               |
| CO2 | Understanding of stress distribution and resulting settler<br>on sand and clayey soils                                  | nent beneath the loaded footings             |
| CO3 | Ability to estimate factor of safety against failure of slop<br>pressure distribution behind earth retaining structures | bes and to compute lateral                   |
| CO4 | Ability to determine bearing capacity of soil and achieve<br>shallow isolated and combined footings for uniform bea     | e proficiency in proportioning ring pressure |
| CO5 | Capable of estimating load carrying capacity of single a  | nd group of piles                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester | Scheme of Study: 18-Scheme       |
|-----|--|----------------------------------|
|     | Course Name :MUNICIPAL WASTEWATER<br>ENGINEERING               | Course Code:18CV55               |
| CO1 | Select the appropriate sewer appurtenances and material        | s in sewer network               |
| CO2 | Design the sewers network and understand the self purif        | ication process in flowing water |
| CO3 | Design the varies physic- chemical treatment units             |                                  |
| CO4 | Design the various biological treatment units                  |                                  |
| CO5 | Design various AOPs and low cost treatment units               |                                  |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme                    |
|-----|---|---|
|     | Course Name :HIGHWAY ENGINEERING  | Course Code:18CV56                            |
| CO1 | Acquire the capability of proposing a new alignment or<br>conduct necessary field investigation for generation of | re-alignment of existing roads, required data |
| CO2 | Evaluate the engineering properties of the materials and same for pavement construction.                          | l suggest the suitability of the              |
| CO3 | Design road geometrics, structural components of pave   | ment and drainage.                            |
| CO4 | Evaluate the highway economics by few select methods knowledge of various highway financing concepts.             | s and also will have a basic                  |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester                   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :SURVEYING PRACTICE  | Course Code:18CVL57        |
| CO1 | Apply the basic principles of engineering surveying and measurements             | d for linear and angular   |
| CO2 | Comprehendeffectivelyfieldproceduresrequiredforapro                              | fessionalsurveyor.         |
| CO3 | Use techniques, skills and conventional surveying instr<br>engineering pr actice | uments necessary f o r     |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester             | Scheme of Study: 18-Scheme    |
|-----|--|-------------------------------|
|     | Course Name :CONCRETE AND HIGHWAY<br>MATERIALS LABORATORY                  | Course Code:18CVL58           |
| CO1 | Able to interpret the experimental results of concrete an laboratory tests | nd highway materials based on |
| CO2 | Determine the quality and suitability of cement                            |                               |
| CO3 | Design appropriate concrete mix Using Professional codes                   |                               |
| CO4 | Determine strength and quality of concrete                                 |                               |
| CO5 | Evaluate the strength of structural elements using NDT                     | techniques                    |
| CO6 | Test the soil for its suitability as sub grade soil for pave               | ements.                       |

|     | Year/ Semester: 3 <sup>rd</sup> Year /5 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme        |
|-----|---|-----------------------------------|
| (   | Course Name :ENVIRONMENTAL STUDIES  | Course Code:18CIV59               |
| CO1 | Understand the principles of ecology and environmenta<br>and water issues on a global scale,            | l issues that apply to air, land, |
| CO2 | Develop critical thinking and/or observation skills, and problem or question related to the environment | apply them to the analysis of a   |

| CO3 | Demonstrate ecology knowledge of a complex relationship between biotic and a biotic |
|-----|---|
|     | components.   |
| CO4 | Apply their ecological knowledge to illustrate and graph a problem and describe the |
|     | realities that managers face when dealing with complex issues.                      |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme     |
|-----|--|--------------------------------|
| Co  | urse Name :DESIGN OF STEEL STRUCTURAL<br>ELEMENTS  | Course Code: 18CV61            |
| CO1 | Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel. |                                |
| CO2 | Understand the Concept of Bolted and Welded connections.   |                                |
| CO3 | Understand the Concept of Design of compression members, built-up columns and columns splices  |                                |
| CO4 | Understand the Concept of Design of tension members, simple slab base and gusseted base.   |                                |
| CO5 | Understand the Concept of Design of laterally supported  | l and un-supported steel beams |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :APPLIED GEOTECHNICAL<br>ENGINEERING   | Course Code:18CV62         |
| CO1 | Ability to plan and execute geotechnical site investigation program for different civil engineering projects   |                            |
| CO2 | Understanding of stress distribution and resulting settlement beneath the loaded footings<br>on sand and clayey soils                                      |                            |
| CO3 | Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures              |                            |
| CO4 | Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure |                            |
| CO5 | Capable of estimating load carrying capacity of single and group of piles  |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester                     | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| Co  | ourse Name :HYDROLOGY AND IRRIGATION<br>ENGINEERING                                | Course Code:18CV63         |
| CO1 | 01 Understand the importance of hydrology and its components                       |                            |
| CO2 | Measure precipitation and analyze the data and analyze the losses in precipitation |                            |
| CO3 | 3 Estimate runoff and develop unit hydrographs                                     |                            |

| CO4 | Find the benefits and ill-effects of irrigation                                     |
|-----|---|
| CO5 | Find the quantity of irrigation water and frequency of irrigation for various crops |
| CO6 | Find the canal capacity, design the canal and compute the reservoir capacity        |

|  | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|--|--|----------------------------|
| Course Name :MATRIX METHOD OF STRUCTURAL<br>ANALYSIS |  | Course Code:18CV641        |
| CO1  | Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems.  |                            |
| CO2  | Identify, formulate and solve engineering problems with respect to flexibility and stiffness matrices as applied to continuous beams, rigid frames and trusses |                            |
| CO3  | Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses.           |                            |
| CO4  | Evaluate secondary stresses  |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester                  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
| Co  | ourse Name :SOLID WASTE MANAGEMENT  | Course Code:18CV642        |
| CO1 | Analyse existing solid waste management system and to identify their drawbacks. |                            |
| CO2 | Evaluate different elements of solid waste management system.                   |                            |
| CO3 | Suggest suitable scientific methods for solid waste management elements         |                            |
| CO4 | Design suitable processing system and evaluate disposal sites                   |                            |

|   | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme                                   |
|---|--|--|
| Course Name :ALTERNATE BUILDING MATERIALS |  | Course Code:18CV643  |
| CO1                                       | Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;   |  |
| CO2                                       | Select appropriate type of masonry unit and mortar for civil engineering constructions;<br>also they are able to Design Structural Masonry Elements under Axial Compression  |  |
| CO3                                       | Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material |  |
| CO4                                       | Recommend various types of alternative building mate<br>a energy efficient building by considering local climat<br>material.   | erials and technologies and design ic condition and building |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :GROUND IMPROVEMENT<br>TECHNIQUES  | Course Code:18CV644        |
| CO1 | Give solutions to solve various problems associated with soil formations having less strength.   |                            |
| CO2 | Use effectively the various methods of ground improvement techniques depending upon the requirements   |                            |
| CO3 | utilize properly the locally available materials and techniques for ground improvement<br>so that economy in the design of foundations of various civil engineering structures |                            |

|              | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme        |
|--------------|--|-----------------------------------|
| Cours<br>AND | e Name : RAILWAYS, HARBOUR, TUNNELING<br>AIRPORTS  | Course Code:18CV645               |
| CO1          | Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.   |                                   |
| CO2          | Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.              |                                   |
| CO3          | Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same. |                                   |
| CO4          | Apply the knowledge gained to conduct surveying, under   | erstand the tunneling activities. |

|       | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester                            | Scheme of Study: 18-Scheme |
|-------|---|----------------------------|
| Cours | e Name : REMOTE SENSING AND GIS   | Course Code:18CV651        |
| CO1   | Collectdataanddelineatevariouselementsfromthesatelliteimageryusingtheirspectralsignatu re |                            |
| CO2   | Analyze different features of ground information to create raster or vector data          |                            |
| CO3   | Perform digital classificationandcreatedifferentthematicmapsforsolvingspecificproblems    |                            |
| CO4   | Make decision based on the GIS analysis on thematic maps                                  |                            |

|       | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester          | Scheme of Study: 18-<br>Scheme |
|-------|---|--------------------------------|
| Cours | se Name : TRAFFIC ENGINEERING   | Course Code:18CV652            |
| CO1   | Understandthehumanfactorsandvehicularfactorsintrafficengineeringdesign. |                                |
| CO2   | Conductdifferenttypesoftrafficsurveysandanalysisofcollected             | datausingstatisticalconcepts.  |
| CO3   | Useanappropriatetrafficflowtheoryandtocomprehendthecapac nalysis.       | ity&signalizedintersectiona    |

# **CO4** Understand the basic knowledge of Intelligent Transportation System

|   | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme    |
|---|--|-------------------------------|
| Course Name : OCCUPATIONAL HEALTH AND<br>SAFETY |  | Course Code:18CV653           |
| CO1   | dentify hazards in the work place that pose a danger or threat to their safety or health, or that of others a danger of the safety or health, or that of others a danger of the safety or health, and the safety or health and thealth and the safety or health and the safet |                               |
| CO2   | Controlunsafeorunhealthyhazardsandproposemethodstoeliminatethehazard   |                               |
| CO3   | Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation.   |                               |
| CO4   | Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors.   |                               |
| CO5   | Identify the decisions required to maintain protection of well as personal health and safety   | the environment, workplace as |

|   | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester                            | Scheme of Study: 18-Scheme         |
|---|---|------------------------------------|
| Co  | urse Name :SUSTAINABILITY CONCEPTS IN<br>CIVIL ENGINEERING                                | Course Code:18CV654                |
| CO1   | Learn the sustainability concepts; understand the role and responsibility of engineers in |                                    |
| CO2   | Quantify sustainability, and resource availability, Ration                                | nalize the sustainability based on |
| 02  | scientific merits.  |                                    |
| CO3   | Understand and apply sustainability concepts in construction practices, designs           |                                    |
| developments and processes across various engineering disciplines |   | disciplines                        |
| CO4   | Make a decision in applying green engineering concepts and become a lifelong              |                                    |
| 0.04  | advocate of sustainability in society.  |                                    |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme         |
|-----|--|------------------------------------|
| Cot | rse Name: INTELLIGENT TRANSPORTATION<br>SYSTEMS  | Course Code:18CV655                |
| CO1 | Students would be able to suggest the appropriate system transportation.   | n/s in various functional areas of |
| CO2 | Would be able to amalgamate the various systems, plan and implement the applications of ITS.   |                                    |
| CO3 | Wouldhave learnt the application of information technology and telecommunication to control traffic and alsoprovide advance information to the travellers, |                                    |
| CO4 | automatic handling of emergencies and to improve safety.   |                                    |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester              | Scheme of Study: 18-Scheme   |
|-----|---|------------------------------|
| Co  | ourse Name: CONSERVATION OF NATURAL<br>RESOURCES                            | Course Code:18CV656          |
| CO1 | Apprehend various components of land as a natural res                       | ource and land use planning. |
| CO2 | Know availability and distribution for water resources as applied to India. |                              |
| CO3 | Analyse the components of air as resource and its pollution                 |                              |
| CO4 | Discuss biodiversity & its role in ecosystem functioning                    |                              |
| CO5 | Critically appreciate the environmental concerns of tod                     | ay                           |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :SOFTWARE APPLICATION<br>LABORATORY  | Course Code:18CVL66        |
| CO1 | use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester                                   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| Cou | Irse Name :ENVIRONMENTAL ENGINEERING<br>LABORATORY   | Course Code:18CVL67        |
| CO1 | Acquire capability to conduct experiments and estimate the concentration of different parameters |                            |
| CO2 | Compare the result with standards and discuss based on the purpose of analysis                   |                            |
| CO3 | Determine type of treatment, degree of treatment for water and waste water                       |                            |
| CO4 | Identify the parameter to be analyzed for the student project work in environmental stream       |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /6 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme            |
|-----|--|---------------------------------------|
| C   | ourse Name :EXTENSIVE SURVEY PROJECT   | Course Code:18CVEP68                  |
| CO1 | Apply Surveying knowledge and tools effectively for th   | e projects                            |
| CO2 | Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies |                                       |
| CO3 | Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.                                   |                                       |
| CO4 | Professional etiquettes at workplace, meeting and general  |                                       |
| CO5 | Establishing trust based relationships in teams & organizational environment   |                                       |
| CO6 | Orientation towards conflicts in team and organizational sources of conflicts, Conflict resolution styles and techn  | l environment, Understanding<br>iques |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme         |
|-----|---|------------------------------------|
| (   | Course Name :QUANTITY SURVEYING AND<br>CONTRACT MANAGEMENT  | Course Code:18CV71                 |
| CO1 | Taking out quantities and work out the cost and preparation cost for various civil engineering works.                 | tion of abstract for the estimated |
| CO2 | Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works. |                                    |
| CO3 | Prepare the specifications and analyze the rates for various items of work.   |                                    |
| CO4 | Assess contract and tender documents for various construction works.  |                                    |

| CO5 | Prepare valuation reports of buildings. |
|-----|---|
|     |   |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| (   | Course Name :DESIGN OF RCC AND STEEL<br>STRUCTURES   | Course Code:18CV72         |
| CO1 | 1 Students will acquire the basic knowledge in design of RCC and Steel Structures.   |                            |
| CO2 | Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members. |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester                                 | Scheme of Study: 18-Scheme      |
|-----|--|---------------------------------|
|     | Course Name : THEORY OF ELASTICITY   | Course Code:18CV731             |
| CO1 | Ability to apply knowledge of mechanics and mathema continuum.                                 | tics to model elastic bodies as |
| CO2 | Ability to formulate boundary value problems; and calculate stresses and strains.              |                                 |
| CO3 | Ability to comprehend constitutive relations for elastic solids and compatibility constraints. |                                 |
| CO4 | Ability to solve two-dimensional problems (plane stres concept of stress function.             | s and plane strain) using the   |

|  | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|--|--|----------------------------|
| Course Name :AIR POLLUTION AND CONTROL Course Code:18CV732 |  | Course Code:18CV732        |
| CO1  | 1. Identify the major sources of air pollution and understand their effects on health and environment. |                            |
| CO2  | 2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.      |                            |
| CO3  | 3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.                    |                            |
| CO4  | 4. Choose and design control techniques for particulate and gaseous emissions.                         |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme                                     |
|-----|--|--|
| C   | ourse Name :PAVEMENT MATERIALS AND<br>CONSTRUCTION   | Course Code:18CV733  |
| CO1 | 1. Students will be able to evaluate and assess the suita<br>to be used in various components of pavement by cond<br>IS,IRC specifications   | ability of any pavement material ducting required tests as per |
| CO2 | 2. Students will be able to formulate the proportions of different sizes of aggregates to suit gradation criteria for various mixes as per MORTH and also design bituminous mixes. |  |
| CO3 | Students will be competent to adapt suitable modern technique and equipment for speedy and economic construction.  |  |
| CO4 | Student will be able to execute the construction of embankment, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction.  |  |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester       | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| Co  | ourse Name :GROUND WATER HYDRAULICS                                  | Course Code:18CV734        |
| CO1 | Find the characteristics of aquifers.                                |                            |
| CO2 | 2 Estimate the quantity of ground water by various methods.          |                            |
| CO3 | Locate the zones of ground water resources.                          |                            |
| CO4 | Select particular type of well and augment the ground water storage. |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :MASONRY STRUCTURES  | Course Code:18CV735        |
| CO1 | 1. Select suitable material for masonry construction by u properties.  | inderstanding engineering  |
| CO2 | 2. Compute loads, load combinations and analyze the stresses in masonry.                                       |                            |
| CO3 | 3. Design masonry under compression (Axial load) for various requirements and conditions.                      |                            |
| CO4 | 4. Design masonry under bending (Eccentric, lateral, transverse load) for various requirements and conditions. |                            |
| CO5 | 5. Assess the behavior of shear wall and reinforced mase   | onry.                      |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme                                      |
|-----|---|---|
| C   | ourse Name :EARTHQUAKE ENGINEERING  | Course Code:18CV741   |
| CO1 | 1. Acquire basic knowledge of engineering seismology  |   |
| CO2 | 2. Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.                             |   |
| CO3 | 3. Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios.  |   |
| CO4 | 4. Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures. |   |
| CO5 | 5. Comprehend planning and design requirements of ea<br>RCC and Masonry structures thorough exposure to diff  | arthquake resistant features of<br>Ferent IS-codes of practices |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
| Cou | urse Name :DESIGN CONCEPT OF BUILDING<br>SERVICES   | Course Code:18CV742        |
| CO1 | Describe the basics of house plumbing and waste water   | collection and disposal.   |
| CO2 | 2 Discuss the safety and guidelines with respect to fire safety.                                      |                            |
| CO3 | Describe the issues with respect to quantity of water, rain water harvesting and roof top harvesting. |                            |
| CO4 | Understand and implement the requirements of thermal comfort in buildings.                            |                            |

|      | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester                   | Scheme of Study: 18-Scheme          |
|------|--|-------------------------------------|
| Cour | se Name :REINFORCED EARTH STRUCTURES   | Course Code:18CV743                 |
| CO1  | identify, formulate reinforced earth techniques that are s different structures; | suitable for different soils and in |
| CO2  | understand the laboratory testing concepts of Geo synthetics                     |                                     |
| CO3  | design RE retaining structures and Soil Nailing concepts                         |                                     |
| CO4  | Determine the load carrying capacity of Foundations resting on RE soil bed.      |                                     |
| CO5  | asses the use of Geo synthetics in drainage requirements                         | s and landfill designs              |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester      | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name :DESIGN OF HYDRAULIC<br>STRUCTURES                      | Course Code:18CV744        |
| CO1 | Check the stability of gravity dams and design the dam.             |                            |
| CO2 | Estimate the quantity of seepage through earth dams.                |                            |
| CO3 | Design spillways and aprons for various diversion works.            |                            |
| CO4 | .Select particular type of canal regulation work for canal network. |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme         |
|-----|--|------------------------------------|
| Cou | arse Name :URBAN TRANSPORT PLANNING  | Course Code:18CV745                |
| CO1 | Design, conduct and administer surveys to provide the planning.  | e data required for transportation |
| CO2 | Supervise the process of data collection about travel behavior and analyze the data for use in transport planning. |                                    |
| CO3 | Develop and calibrate modal split, trip generation rates for specific types of land use developments.              |                                    |
| CO4 | Adopt the steps that are necessary to complete a long-   | term transportation plan           |

| Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester |  | Scheme of Study: 18-Scheme |
|--|--|----------------------------|
| 0  | Course Name :FINITE ELEMENT METHOD   | Course Code:18CV751        |
| CO1  | The student will have the knowledge on advanced methods of analysis of structures. |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
| C   | ourse Name :NUMERICAL METHODS AND<br>APPLICATIONS   | Course Code:18CV752        |
| CO1 | The students will have a clear perception of the power of numerical techniques, ideas<br>and would be able to demonstrate the applications of these techniques to problems<br>drawn from Industry, management and other engineering fields. |                            |

|       | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme         |
|-------|---|------------------------------------|
| Cours | se Name :ENVIRONMENTAL PROTECTION AND<br>MANAGEMENT   | Course Code:18CV753                |
| CO1   | Appreciate the elements of Corporate Environmental Ma<br>to international environmental management system stand | anagement systems complying dards. |
| CO2   | Lead pollution prevention assessment team and implement waste minimization options.                             |                                    |
| CO3   | Develop, Implement, maintain and Audit Environmenta<br>Organizations.   | l Management systems for           |

| Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester |                                   | Scheme of Study: 18-Scheme |
|--|-----------------------------------|----------------------------|
| Course Name :COMPUTER AIDED DETAILING OF<br>STRUCTURES         |                                   | Course Code:18CVL76        |
| CO1  | Prepare detailed working drawings |                            |

|     | Year/ Semester: 4 <sup>th</sup> Year /7 <sup>th</sup> Semester                       | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
| Co  | urse Name :GEOTECHNICAL ENGINEERING<br>LABORATORY                                    | Course Code:18CVL77        |
| CO1 | Physical and index properties of the soil  |                            |
| CO2 | 2 Classify based on index properties and field identification                        |                            |
| CO3 | To determine OMC and MDD, plan and assess field compaction program                   |                            |
| CO4 | Shearstrengthandconsolidationparameterstoassessstrengthanddeformationcharacteristics |                            |
| CO5 | 5 In-suits hear strength characteristics(SPT-Demonstration)                          |                            |

|       | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester                  | Scheme of Study: 18-Scheme |
|-------|---|----------------------------|
| Cours | se Name :DESIGN OF PRE-STRESSECONCRETE  | Course Code:18CV81         |
| CO1   | Understand the requirement of PSC members for present scenario                  |                            |
| CO2   | Analyse the stresses encountered in PSC element during transfer and at working. |                            |
| CO3   | Understand the effectiveness of the design of PSC after                         | studying losses            |

| <b>CO4</b> | Capable of analyzing the PSC element and finding its efficiency. |
|------------|--|
| CO5        | Design PSC beam for different requirements                       |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :BRIDGE ENGINEERING                                | Course Code:18CV821        |
| CO1 | Understand the load distribution and IRC standards             |                            |
| CO2 | Design the slab and T beam bridges                             |                            |
| CO3 | Design Box culvert, pipe culvert                               |                            |
| CO4 | Use bearings, hinges and expansion joints and                  |                            |
| CO5 | Design Piers and abutments                                     |                            |

|            | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester                        | Scheme of Study: 18-Scheme |
|------------|---|----------------------------|
| Co         | ourse Name :PREFABRICATED STRUCTURES  | Course Code:18CV822        |
| CO1        | Use modular construction, industrialized construction                                 |                            |
| CO2        | Design prefabricated elements   |                            |
| CO3        | Design some of the prefabricated elements   |                            |
| <b>CO4</b> | Use the knowledge of the construction methods and prefabricated elements in buildings |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :ADVANCED FOUNDATION<br>ENGINEERING  | Course Code:18CV823        |
| CO1 | Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria           |                            |
| CO2 | Estimate the load carrying capacity and settlement of single piles and pile groups including laterally loaded piles. |                            |
| CO3 | Understand the basics of analysis and design principles of well foundation, drilled piers<br>and caissons            |                            |
| CO4 | Understand basics of analysis and design principles of n   | nachine foundations.       |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name :REHABILITATION AND<br>RETROFITTING   | Course Code:18CV824        |
| CO1 | Identify the causes for structural (Concrete) deterioration   |                            |
| CO2 | Assess the type and extent of damage and carry out damage assessment of structures through various types of tests |                            |
| CO3 | Recommend maintenance requirements of the buildings and preventive measures against influencing factors           |                            |
| CO4 | Select suitable material and suggest an appropriate method for repair and rehabilitation.                         |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester                             | Scheme of Study: 18-Scheme   |
|-----|--|------------------------------|
|     | Course Name : PAVEMENT DESIGN  | Course Code:18CV825          |
| CO1 | Systematically generate and compile required data's for design of pavement (Highway        |                              |
| CO2 | Analyze stress, strain and deflection by business's, bur mister's and westergaard's theory |                              |
| CO3 | Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001        |                              |
| CO4 | Evaluate the performance of the pavement and also dev based on sitespecific requirements   | velops maintenance statement |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester   | Scheme of Study: 18-Scheme |
|-----|--|----------------------------|
|     | Course Name :PROJECT WORK PHASE-2  | Course Code:18CVP83        |
| CO1 | Describe the project and be able to defend it.   |                            |
| CO2 | Develop critical thinking and problem solving skills.  |                            |
| CO3 | Learn to use modern tools and techniques.  |                            |
| CO4 | Communicate effectively and to present ideas clearly and coherently both in written and oral forms.      |                            |
| CO5 | Develop skills to work in a team to achieve common goal.   |                            |
| CO6 | Develop skills of project management and finance.  |                            |
| CO7 | Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.     |                            |
| CO8 | Prepare them for life-long learning to face the challenges and support the technological changes to meet |                            |

|     | Year/ Semester: 3 <sup>rd</sup> Year /8 <sup>th</sup> Semester  | Scheme of Study: 18-Scheme |
|-----|---|----------------------------|
|     | Course Name : TECHNICAL SEMINAR   | Course Code:18CVS84        |
| CO1 | Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study. |                            |
| CO2 | Identify and discuss the current, real-time issues and challenges in engineering & technology.                                  |                            |
| CO3 | Develop written and oral communication skills.  |                            |
| CO4 | Explore concepts in larger diverse social and academic contexts.  |                            |
| CO5 | Apply principles of ethics and respect in interaction with others.  |                            |
| CO6 | Develop the skills to enable life-long learning.  |                            |