

**R.M.K. ENGINEERING COLLEGE**  
RSM Nagar, Kavaraipettai – 601 206

**Department of Civil Engineering**

**Course Outcomes – ODD Semester 2020-21**

Sl. No.	Semester	Theory/Practical	Course Code / Course Name
1)	3	Theory	MA8353- <a href="#">Transforms and Partial Differential Equations</a>
2)	3	Theory	CE8301-Strength of Materials I
3)	3	Theory	CE8302-Fluid Mechanics
4)	3	Theory	CE8351-Surveying
5)	3	Theory	CE8391-Construction Materials
6)	3	Theory	CE8392- <a href="#">Engineering Geology</a>
7)	3	Practical	CE8311-Construction Materials Laboratory
8)	3	Practical	CE8361-SurveyingLaboratory
9)	3	Practical	HS8381-Interpersonal Skills/ Listening and Speaking
10)	5	Theory	CE8501-Design of Reinforced Concrete Elements
11)	5	Theory	CE8502-Structural Analysis I
12)	5	Theory	EN8491- <a href="#">Water</a> Supply Engineering
13)	5	Theory	CE8591-Foundation Engineering
14)	5	Theory	GE8071-Disaster Management (Professional Elective – I)
15)	5	Theory	ORO551-Renewable Energy Sources(Open Elective)
16)	5	Practical	CE8511-Soil Mechanics Laboratory
17)	5	Practical	CE8512-Water and Waste water Analysis Laboratory
18)	5	Practical	CE8513-Survey Camp
19)	7	Theory	CE8701- Estimation, Costing and Valuation Engineering
20)	7	Theory	CE8702-Railways, Airports, Docks and Harbour Engineering
21)	7	Theory	CE8703-Structural Design and Drawing
22)	7	Theory	CE8011-Design of Prestressed Concrete Structures (Elective)
23)	7	Theory	OML7501-Testing of Materials (Elective)
24)	7	Practical	CE8711- Creative And Innovative Project(ActivityBased - Subject Related)
25)	7	Practical	CE8712- Industrial Training (4 Weeks During Vi Semester – Summer)

### Third Semester B.E.

#### MA8353-[Transforms and Partial Differential Equations](#)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand how to solve the given standard partial differential equations.
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.
CO6	Demonstrate mathematical facts and ideas behind the engineering problems.

#### CE8301 - STRENGTH OF MATERIALS I

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the concepts of stress and strain, principal stresses and principal planes.
CO2	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO3	Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
CO4	Apply basic equation of torsion in design of circular shafts and helical springs,
CO5	Analyze the pin jointed plane and space trusses
CO6	Analyze determinate structures as a pre-requisite for Strength of Materials-II

#### CE8302-Fluid Mechanics

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
CO2	Understand and solve the problems related to equation of motion.
CO3	Gain knowledge about dimensional and model analysis.
CO4	Learn types of flow and losses of flow in pipes.
CO5	Understand and solve the boundary layer problems.
CO6	Knowledge of the applicability of conversion laws in addressing fluid mechanics problems.

CE8351-Surveying

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	The use of various surveying instruments and mapping
CO2	Measuring Horizontal angle and vertical angle using different instruments
CO3	Methods of Leveling and setting Levels with different instruments
CO4	Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
CO5	Concept and principle of modern surveying.
CO6	Outline the concept and principle of modern surveying.

CE8391-Construction Materials

COs	Course Outcome: The students, after the completion of the course, are expected to ....
CO1	Compare the properties of most common and advanced building materials.
CO2	understand the typical and potential applications of lime, cement and aggregates
CO3	know the production of concrete and also the method of placing and making of concrete elements.
CO4	understand the applications of timbers and other materials
CO5	Understand the importance of modern material for construction.
CO6	Understand the properties of various materials used in construction

CE8392-[Engineering Geology](#)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
CO2	basic knowledge on properties of minerals.
CO3	Gain knowledge about types of rocks, their distribution and uses.
CO4	Basic Knowledge on Structural Geology.
CO5	understand the methods of study on geological structure.
CO6	understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

**Laboratory**

CE8311-Construction Materials Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

CE8361-SurveyingLaboratory

COs	<b>Course Outcome : The students, after the completion of the course, are expected to ....</b>
CO1	have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS
CO2	have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.

HS8381 - Interpersonal Skills / Listening & Speaking

COs	<b>Course Outcome : The students, after the completion of the course, are expected to ....</b>
CO1	Listen and respond appropriately.
CO2	Participate in group discussions
CO3	Make effective presentations
CO4	Participate confidently and appropriately in conversations both formal and informal

**Fifth Semester B.E**

CE8501-Design of Reinforced Concrete Elements

COs	<b>Course Outcome : The students, after the completion of the course, are expected to ....</b>
CO1	Understand the various design methodologies for the design of RC elements
CO2	Analyse and design of beams by working stress method and Limit state method.
CO3	Know the analysis and design of flanged beams by limit state method and design of beams for shear, bond and torsion.
CO4	Design the various types of slabs and staircase by limit state method.
CO5	Design columns for axial, uniaxial and biaxial eccentric loadings.
CO6	Design of footing by limit state method.

CE8502-Structural Analysis I

COs	<b>Course Outcome : The students, after the completion of the course, are expected to ....</b>
CO1	Analyse continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
CO2	Analyse the continuous beams and rigid frames by slope deflection method.
CO3	Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway
CO4	Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
CO5	Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.
CO6	Understand the concept of indeterminate structures and analysis of continuous beams, pinjointed trusses and rigid plane frames.

EN8491-[Water](#) Supply Engineering

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
CO2	an understanding of water quality criteria and standards, and their relation to public health
CO3	the knowledge in various unit operations and processes in water treatment
CO4	an ability to design the various functional units in water treatment
CO5	the ability to design and evaluate water supply project alternatives on basis of chosen criteria
CO6	The ability to understand modern water treatment principles and should be able to cope with the basic design and operation of unit processes for conventional and advanced water treatment.

CE8591-Foundation Engineering

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the site investigation, methods and sampling.
CO2	Get knowledge on bearing capacity and testing methods.
CO3	Analyze and compute the magnitude of settlement of foundations on granular and clay deposits.
CO4	Design shallow footings.
CO5	Determine the load carrying capacity, settlement of pile foundation.
CO6	Determine the earth pressure on retaining walls and analysis for stability.

GE8071-Disaster Management (Professional Elective – I)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Classify the various types of disaster and providing exposure to mitigation measures
CO2	Understand the Phases of Disaster management cycle and the approaches to disaster risk reduction
CO3	Analyse the impacts of disaster and vulnerability factors
CO4	Understand the management strategies in components of disaster relief.
CO5	To get exposure on technologies to assess and manage the risks from disaster
CO6	Assess the case studies of natural and man-made disasters

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ORO551-Renewable Energy Sources(Open Elective)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understanding the physics of solar radiation.
CO2	Ability to classify the solar energy collectors and methodologies of storing solar energy.
CO3	Knowledge in applying solar energy in a useful way.
CO4	Knowledge in wind energy and biomass with its economic aspects.
CO5	Knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies.
CO6	To design a Solar Home system understanding the power consumption and requirements.

**Laboratory**

CE8511-Soil Mechanics Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Students are able to conduct tests to determine both the index and engineering properties of soils
CO2	Able to characterize the soil based on their properties.

CE8512-Water and Waste water Analysis Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Quantify the pollutant concentration in water and wastewater
CO2	Suggest the type of treatment required and amount of dosage required for the treatment
CO3	Examine the conditions for the growth of micro-organisms

CE8513-Survey Camp

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Determine the area of traverse using Total station and GPS
CO2	Plot contours and the undulating ground surface.
CO3	Perform highway alignment and set out curves for new roads.
CO4	Handle total station and do field observation using it.
CO5	Participate as a team and work with fellow mates in carrying out the surveying of Sun observation to determine azimuth

### Seventh Semester B.E.

#### CE8701- Estimation, Costing and Valuation Engineering

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the methods and various types of estimation and estimate the quantities of buildings and special structures.
CO2	Outline the standard data and schedule of rates for labour and materials
CO3	Analyse the Rate and cost estimate for Buildings, canals, and Roads.
CO4	Understand the types of specifications, principles for report preparation, tender notices types.
CO5	Outline the necessity of contract document, bidding and types of contract.
CO6	Evaluate valuation and rent calculation of land and buildings.

#### CE8702- Railways, Airports, Docks And Harbour Engineering

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the methods of route alignment and design elements in Railway Planning and Constructions.
CO2	Understand the Construction techniques and Maintenance of Track laying and Railway stations.
CO3	Gain an insight on the planning and site selection of Airport Planning and design.
CO4	Analyze and design the elements for orientation of runways and passenger facility systems.
CO5	Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.
CO6	Discriminate the various coastal structures like pier, breakwater, wharves, jetties, quays, etc

#### CE8703- Structural Design And Drawing

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls
CO2	Design and draw flat slab as per code provisions
CO3	Design and draw reinforced concrete and steel bridges
CO4	Design and draw reinforced concrete and steel water tanks
CO5	Design and detail the various steel trusses and gantry girders
CO6	Design and draw RC Solid Slab Bridge

CE8011-Design Of Prestressed Concrete Structures (Elective)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Describe the fundamental principles of pre and post tensioned concrete and compute loss of stresses and deflection of prestressed members
CO2	Design of pre and post tensioned concrete Sections for flexure and shear as per codal provisions.
CO3	Explain the various methods of design of anchorage zones
CO4	Analysis the stresses in composite sections and Design of composite sections.
CO5	Design of prestressed Concrete water tanks and pipes
CO6	Design of tension and compression members of PSC sections

OML751-Testing of Materials (Elective)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Identify suitable testing technique to inspect any industrial component.
CO2	Practice the different mechanical testing techniques and know its applications and limitations
CO3	Practice the different non-destructive testing techniques and know its applications and limitations
CO4	Practice the different material characterization techniques and know its applications and limitations
CO5	Practice the different Thermal Testing techniques and know its applications and Limitations
CO6	Practice the different chemical Testing techniques and know its applications and Limitations

**Laboratory**

CE8712- Industrial Training (4 Weeks During VI Semester – Summer)

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	The intricacies of implementation textbook knowledge into practice
CO2	The concepts of developments and implementation of new techniques



**Course Outcomes – EVEN Semester 2020-21**

<b>Sl. No.</b>	<b>Semester</b>	<b>Theory/Practical</b>	<b>Course Code / Course Name</b>
1)	4	Theory	MA 8491-Numerical Methods
2)	4	Theory	CE 8401-Construction Techniques & Practices
3)	4	Theory	CE 8402-Strength of Materials II
4)	4	Theory	CE 8403-Applied Hydraulic Engineering
5)	4	Theory	CE 8404-Concrete Technology
6)	4	Theory	CE 8491-Soil Mechanics
7)	4	Practical	CE 8481-Strength of Materials Laboratory
8)	4	Practical	CE 8461-Hydraulic Engineering Laboratory
9)	4	Practical	HS 8461-Advance Reading and Writing
10)	6	Theory	CE 8601-Design of Steel Structures
11)	6	Theory	CE 8602-Structural Analysis – II
12)	6	Theory	CE 8603-Irrigation Engineering
13)	6	Theory	CE 8604-Highway Engineering
14)	6	Theory	EN8592-Waste Water Engineering
15)	6	Theory	CE 8001-Ground Improvement Techniques (Elective 1)
16)	6	Practical	CE 8611- Highway Engineering Laboratory
17)	6	Practical	CE 8612- Irrigation and Environmental Engineering Drawing
18)	6	Practical	HS 8581-Professional Communication
19)	8	Theory	GE 8076- Professional Ethics In Engineering (Elective)
20)	8	Theory	CE 8020- Maintenance, Repair And Rehabilitation Of Structures (Elective)
21)	8	Practical	CE 8811-Project Work

## Fourth Semester B.E.

### MA 8491-Numerical Methods

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the basic concepts and techniques of solving algebraic and transcendental equations.
CO2	Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations
CO3	Apply the numerical techniques of differentiation and integration for engineering problems.
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications
CO6	Demonstrate mathematical facts and ideas behind the engineering problems.

### CE 8401-Construction Techniques & Practices

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	know the different construction techniques and structural systems
CO2	Understand various techniques and practices on masonry construction, flooring, and roofing.
CO3	Plan the requirements for substructure construction.
CO4	Know the methods and techniques involved in the construction of various types of super structures Select, maintain and operate hand and power tools and equipment used in the building construction sites.
CO5	Understand various Construction equipments used for earthwork, foundation, dredging, trenching and tunneling
CO6	know the different construction techniques and structural systems

### CE 8402-Strength of Materials II

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.
CO2	Analyse indeterminate beams to determine shear force, bending moment and deflection.
CO3	Examine the effect of axial and eccentric loads on short and long columns.
CO4	Determine the stresses developed in thick and compound cylinders subjected to internal fluid pressure.
CO5	Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
CO6	Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.

### CE 8403-Applied Hydraulic Engineering

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Apply their knowledge of fluid mechanics in addressing problems in open channels
CO2	Able to identify a effective section for flow in different cross sections
CO3	To solve problems in uniform, gradually and rapidly varied flows in steady state conditions
CO4	Compute an impact of jet on fixed and moving plates.
CO5	Understand the principles, working and application of turbines
CO6	Understand the principles, working and application of pumps

### CE 8404-Concrete Technology

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	The various requirements of cement, aggregates and water for making concrete
CO2	The effect of admixtures on properties of concrete
CO3	The concept and procedure of mix design as per IS method
CO4	The properties of concrete at fresh and hardened state
CO5	The importance and application of special concretes.
CO6	Identify, describe and carry out tests relevant to the use of concrete on site

### CE 8491-Soil Mechanics

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Classify the soil and assess the engineering properties, based on index properties.
CO2	Identify permeability characteristics for field conditions
CO3	Understand the stress concepts in soils
CO4	Understand and identify the settlement in soils.
CO5	Determine the shear strength of soil
CO6	Analyze both finite and infinite slopes.

### CE 8481-Strength of Materials Laboratory

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.

### CE 8461-Hydraulic Engineering Laboratory

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	The students will be able to measure flow in pipes and determine frictional losses
CO2	The students will be able to develop characteristics of pumps and turbines

### HS 8461-Advance Reading and Writing

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Write different types of essays
CO2	Write winning job applications
CO3	Read and evaluate texts critically
CO4	Display critical thinking in various professional contexts

### Sixth Semester B.E.

#### CE 8601-Design of Steel Structures

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Understand the concepts of various design philosophies
CO2	Conceptualise the design of structural members using working stress method
CO3	Design common bolted and welded connections for steel structures
CO4	Design tension members and understand the effect of shear lag.
CO5	Understand the design concept of axially loaded columns and column base connections.
CO6	Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

#### CE 8602-Structural Analysis – II

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Draw influence lines for statically determinate structures and calculate critical stress resultants.
CO2	Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
CO3	Analyse of three hinged, two hinged and fixed arches.
CO4	Analyse the suspension bridges with stiffening girders
CO5	Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.
CO6	Understand the concept of analysis of indeterminate beams using influence line diagrams and plastic analysis method.

#### CE 8603-Irrigation Engineering

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Have knowledge and skills on crop water requirements.
CO2	Understand the methods and management of irrigation.
CO3	Gain knowledge on types of Impounding structures
CO4	Understand methods of irrigation including canal irrigation.
CO5	Get knowledge on water management on optimization of water use.
CO6	Gain knowledge on Participatory irrigation management.

### **CE 8604-Highway Engineering**

<b>Cos</b>	<b>Course Outcome : The students, after the completion of the course, are expected to</b> ....
<b>CO1</b>	Get knowledge on planning and aligning of highway.
<b>CO2</b>	Geometric design of highways
<b>CO3</b>	Design flexible and rigid pavements.
<b>CO4</b>	Gain knowledge on Highway construction materials, properties, testing methods
<b>CO5</b>	Understand the concept of pavement management system, evaluation of distress.
<b>CO6</b>	Outline the maintenance strategies of highways.

### **EN8592-Waste Water Engineering**

<b>COs</b>	<b>Course Outcome : The students, after the completion of the course, are expected to</b> ....
<b>CO1</b>	An ability to estimate sewage generation and design sewer system including sewage pumping stations
<b>CO2</b>	The required understanding on the characteristics and composition of sewage, self-purification of streams
<b>CO3</b>	An ability to perform basic design of the unit operations and processes that are used in sewage treatment
<b>CO4</b>	Understand the standard methods for disposal of sewage.
<b>CO5</b>	Gain knowledge on sludge treatment and disposal.
<b>CO6</b>	Understanding the different sludge management methods involved in waste water treatment.

### **CE 8001-Ground Improvement Techniques (Elective 1)**

<b>Cos</b>	<b>Course Outcome : The students, after the completion of the course, are expected to</b> ....
<b>CO1</b>	Gain knowledge on methods and selection of ground improvement techniques.
<b>CO2</b>	Understand dewatering techniques and design for simple cases.
<b>CO3</b>	Get knowledge on insitu treatment of cohesionless and cohesive soils.
<b>CO4</b>	Understand the functions of Geosynthetics in Engineering constructions.
<b>CO5</b>	Understand the concept of earth reinforcement and design of reinforced earth.
<b>CO6</b>	Get to know types of grouts and grouting technique.

### **Laboratory**

#### **CE 8611- Highway Engineering Laboratory**

<b>Cos</b>	<b>Course Outcome : The students, after the completion of the course, are expected to</b> ....
<b>CO1</b>	Student knows the techniques to characterize various pavement materials through relevant tests.

#### **CE 8612-Irrigation and Environmental Engineering Drawing**

<b>Cos</b>	<b>Course Outcome : The students, after the completion of the course, are expected to</b> ....
<b>CO1</b>	The students after completing this course will be able to design and draw various units of Municipal water treatment plants and sewage treatment plants.

### HS 8581-Professional Communication

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Make effective presentations
CO2	Participate confidently in Group Discussions.
CO3	Attend job interviews and be successful in them.
CO4	Develop adequate Soft Skills required for the workplace

### Eight Semester B.E.

#### GE 8076- Professional Ethics In Engineering (Elective)

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	Student will be able to understand the human values and the method of living peacefully
CO2	Student will be able to know the senses of Engineering ethics & ethical theories
CO3	Student will be able to apply the code of ethics in Engineering
CO4	Student will be able to assess the safety and perform risk analysis
CO5	Student will be able to understand the global issues in multinational corporations & computer ethics
CO6	Student will be able to apply ethics in society, discuss the ethical issues related to Engineering & realize responsibilities and rights in the society

#### CE 8020- Maintenance, Repair And Rehabilitation Of Structures

Cos	Course Outcome : The students, after the completion of the course, are expected to ....
CO1	the importance of maintenance and assessment method of distressed structures.
CO2	the strength and durability properties ,their effects due to climate and temperature.
CO3	recent development in concrete
CO4	the techniques for repair and protection methods
CO5	Understand the behavior of corrosion and it's various protection techniques
CO6	repair, rehabilitation and retrofitting of structures and demolition methods.

#### CE 8811-Project Work

COs	Course Outcome : The students, after the completion of the course, are expected to ....
CO	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.