



Veermata Jijabai Technological Institute (V.J.T.I.)

(Central Technological Institute, Maharashtra State, INDIA)

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Website: www.vjti.ac.in

Programme Name: Diploma in Civil Engineering

With Effect From Academic Year

: 2023-24

Duration

: 16 WEEKS

Scheme

: R-2023

Programme Code : DCE

Duration of Programme : 6 Semester

Semester : Third

| Sr No | Course Title | Abbreviation | Course Type | Course Code | Total IKS Hrs for Sem. | Learning Scheme | | | | Assessment Scheme | | | | | | | | | | | | | |
|--------------|---|--------------|-------------|-------------|------------------------|--------------------------|-----------|--|-------------------------------|-------------------|-----------------------|-----------|-------------|------------------|-----------|------------|---------------|------------------------|-----|-----|-----|-----|-----|
| | | | | | | Actual Contact Hrs./Week | | Self-Learning (Term Work + Assignment) | Notional Learning Hours /Week | Credits | Paper Duration (Hrs.) | Theory | | Based on LL & TL | | | | Based on Self Learning | | | | | |
| | | | | | | CL | TL | | | | | LL | FA-TH (MST) | SA-TH (ESE) | Total | FA-PR (CA) | SA-PR (PR/OR) | Max | Min | Max | Min | | |
| | | | | | | 3 | 2 | - | 30 | 70 | 28 | 100 | 40 | 25 | 10 | 25 | 10 | 25 | 10 | | | | |
| 1 | HYDRAULICS | HYD | DSC | 231CE31 | 1 | 3 | 2 | - | 2 | 7 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | 25 | 10 | 150 | |
| 2 | ROAD & BRIDGE ENGINEERING | RBE | DSC | 231CE32 | 1 | 3 | - | 2 | 1 | 6 | 3 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | 25 | 10 | 150 | |
| 3 | SURVEYING | SUR | SEC | 231CE33 | 1 | 3 | - | 4 | 7 | 7 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | 25# | 10 | 150 | |
| 4 | MECHANICS OF STRUCTURES CONCRETE TECHNOLOGY | MOS | DSC | 231SE34 | | 3 | - | 2 | 2 | 7 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | | 25 | 10 | 150 |
| 5 | COMPUTER-AIDED DRAWING | CT | DSC | 231SE35 | | 3 | 2 | - | 2 | 7 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | | 25 | 10 | 150 |
| 6 | ESSENCE OF INDIAN CONSTITUTION | CAD | SEC | 231CE36 | - | | | 4 | | 4 | 2 | | | | | | | 50 | 20 | 50# | 20 | | 100 |
| 7 | | EIC | VEC | 231CE37 | - | 1 | | | 1 | 2 | 1 | | | | | | | | | | 50 | 20 | 50 |
| Total | | | | | | 3 | 16 | 4 | 12 | 8 | 40 | 20 | 500 | 175 | 75 | 150 | 900 | | | | | | |

Abbreviations : CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends : @ Internal Assessment, # External Assessment, *# Online Examination , @\$ Internal Online Examination

Course Category : Discipline Specific Course Core (DSC) : 2, Discipline Specific Elective (DSE) : 0, Value Education Course (VEC) : 1, Intern./Apprentice./Project./Community (INP) : 0, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

(Signature)
Curriculum Coordinator



(Signature)
Dean - Diploma

Head
Diploma in Civil Engineering

| | |
|-------------------|--------------------------------|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : HYDRAULICS |
| COURSE CODE | : 231CE31 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|-----------------|--------|--------|----------------------|-----|--------------------|----------------|-------------|-----|-------|-----|-------------------------------|-----|------------------|-----|----------------------------|-----|----------------|
| C L | T L | L L | Self lear ning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | TOTAL | | Based on LL & TL Practical | | | | Based on Self- learning | | TOTAL MARKS |
| | | | | | | | Max | Min | Max | Min | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | |
| | | | | | | Max | | | | | Min | Max | Min | Max | Min | Max | |
| 3 | 2 | - | 2 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25@ | 10 | - | - | 25@ | 10 | 150 |

@: assessment by Internal Examiner

II. Rationale

While constructing any of hydraulic structures like dams, canals, and hydroelectric power stations, designing water supply systems, etc.; a Civil Engineer must have knowledge about the properties of fluids, water pressure, types of flows, and different hydraulics machines.

III. Course Outcomes (COS)

Students should be able to

| | |
|-----|--|
| CO1 | Relate the fundamental principles of hydraulics for the measurement of different hydraulic parameter |
| CO2 | Measure the pressure and quantity of flow of water in different conditions using various pressure measuring devices. |
| CO3 | Compute discharge and losses occur for fluid flow through pipes and channels |
| CO4 | Identify the different hydraulic machines |



IV. Course Contents with Specification Table

| SECTION - I | | | | | | | |
|-----------------|---|-------|-------|-----|---------|---------|---------|
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | Introduction | 05 | 6 | 1 | 30% | 50% | 20% |
| 1.1 | Definition of fluid, Introduction to fluid mechanics and Hydraulics. Types of Fluid. | | | | | | |
| 1.2 | Importance of Hydraulics with respect to Irrigation and Environmental engineering. | | | | | | |
| 1.3 | Physical properties of fluid - Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity, Measurement of Viscosity using Viscometer | | | | | | |
| 1.4 | Numerical problem based on it | | | | | | |
| 2 | Pressure and its measurement | 11 | 14 | 1,2 | 40% | 30% | 30% |
| 2.1 | Definition of pressure and its SI unit, Compressible and Incompressible fluid, Hydrostatic pressure at point- Pascal's law, Variation of pressure in static liquid. Pressure, Diagram, Numerical problems based on it. | | | | | | |
| 2.2 | Total pressure and center of pressure, vertical plain surface submerged in liquids, and Horizontal plain surface submerged in liquid, Inclined plain surface submerged in liquid Numerical problems. | | | | | | |



| | | | | | | | |
|----------|--|---|----|---|-----|-----|-----|
| 2.3 | Absolute, gauge, atmospheric & vacuum pressure, measurement of pressure manometers and mechanical gauges. Numerical on Piezometer and U tube manometer. | | | | | | |
| 3 | Fundamentals Of Fluid Flow-I | | | | | | |
| 3.1 | Concept of flow, Gravity flow and pressure flow. Types of flow – steady and Unsteady, uniform and non-uniform, Laminar and turbulent. Reynolds number and its application. | 8 | 15 | 2 | 40% | 30% | 30% |
| 3.2 | Discharge and its units Continuity equation for fluid flow. Datum head, pressure head, velocity head and total head, Bernoulli's theorem for ideal and real Fluids, Impulse momentum theorem statement, assumptions, equation. | | | | | | |

SECTION - II

| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
|-----------------|---|-------|-------|----|---------|---------|---------|
| 4 | Fundamentals Of Fluid Flow-II | | | | | | |
| 4.1 | Venturi meter, orifice meter and their Comparison. Classification of orifices, Flow through an orifice, Numerical Problems. | 07 | 10 | 3 | 20% | 30% | 50% |
| 4.2 | Hydraulic coefficients: coefficient of velocity, coefficient of contraction, coefficient of discharge. Classification of mouthpieces. | | | | | | |



| | | | | | | | |
|------------|---|-----------|-----------|------------|------------|------------|------------|
| 5 | Flow through Pipes | | | | | | |
| 5.1 | Pipes and Pipe line. Loss of Head in pipe line. Major losses due to friction by Darcy Weisbach formula and Chezy's formula, minor energy losses due to sudden enlargement, sudden contraction, at the entrance of a pipe, at the exit of a pipe, due to bend in pipe, due to obstruction in a pipe and Loss of head in various pipe fittings. Numerical Problems. | 10 | 14 | 3 | 40% | 30% | 30% |
| 5.2 | Hydraulics gradient & total energy line and its application in pipeline, Syphon and its uses. Numerical Problems on Flow through pipes in series, Compound pipe equivalent pipe, flow through parallel pipes, Flow through branched pipes. | | | | | | |
| 5.3 | Water Hammer, Surge tank: Principle, Causes, effects and types of Surge tank | | | | | | |
| 6 | Flow in open channels | | | | | | |
| 6.1 | Classification of flow in channels- steady & unsteady flow, uniform & non uniform flow, laminar & turbulent flow, sub-critical, critical & supercritical flow. | 7 | 11 | 3,4 | 20% | 50% | 30% |
| 6.2 | Discharge through open channel by Chezy's formula, most economical rectangular channel section. Numerical Problems | | | | | | |



| | | | | | | | |
|-----|---|--|--|--|--|--|--|
| 6.3 | Classification of notches & weirs, discharge over rectangular notch or weir, discharge over triangular notch or weir. Numerical Problems. | | | | | | |
| 6.4 | Introduction to Pumps and Turbines | | | | | | |

V. List of Practical:

| Sr. No. | Practical/Assignment/Tutorial Title | Hours | CO |
|---------|---|-------|-----|
| 1 | Pressure measuring device | 04 | CO2 |
| 2 | Hydrostatics Law | 02 | CO1 |
| 3 | Bernoulli's theorem | 02 | CO1 |
| 4 | Measurement of Discharge using measuring tank/Can | 02 | CO3 |
| 5 | Flowmeter | 06 | CO2 |
| 6 | Calibration of Orifice | 02 | CO2 |
| 7 | Flow Visualization -Reynold Apparatus. | 02 | CO2 |
| 8 | Major Loss in the pipe | 02 | CO3 |
| 9 | Minor losses in pipes (any two) | 02 | CO3 |
| 10 | Uniform Flow | 04 | CO3 |
| 11 | Notches | 04 | CO3 |
| 12 | Study of Pump/Turbine | 02 | CO4 |
| 13 | Digital Water Level Indicator | 02 | CO1 |

*Minimum 8 and maximum 13 practical / experiment sessions to be included in a course in a term

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam



VII. Text Book, Reference Books and Websites:

| Sr. No. | Author | Title | Publisher and Edition |
|---------|------------------------------|---|---|
| 1. | Dr. P. N. Modi & Dr. S. Seth | A Text Book of Hydraulics & Fluids Mechanics | Standard Book House, New Delhi. Edition 17th 2009. |
| 2. | R. K. Rajput | A Text Book of Fluids Mechanics & Hydraulics | Edition 2nd reprint 2004 Publisher S. Chand & Company Ltd. New Delhi |
| 3. | Dr. R.K. Bansal | Fluid Mechanics and Hydraulic Machines | Edition 9th 2005 Publisher- Laxmi Publications Pvt. Ltd., New Delhi. |
| 4. | S. K. Likhi | Hydraulics Laboratory Manual | T.T.T.I. Chandhigrah. |
| 5. | NPTEL Lectures | https://archive.nptel.ac.in/courses/105/105/105105203/ | |

VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|---|---------------------------|---|----------------------------|----------------------------|-------------------------------------|-------|-------|-------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 | PSO-4 |
| CO1 | 2 | 3 | - | - | 2 | - | 1 | 2 | - | - | 1 |
| CO2 | 3 | 3 | 2 | 3 | 2 | - | 2 | 2 | - | 1 | 1 |
| CO3 | 3 | 2 | 2 | 3 | 3 | - | 2 | 3 | - | 2 | 1 |
| CO4 | 1 | - | - | 1 | 1 | - | 1 | 1 | - | 1 | 1 |

Legends: - High:03, Medium:02, Low:01, No Mapping: -

Curriculum Coordinator

Head of the Department

Dean Diploma

BOS approved dated 10/07/2024



| | |
|--------------------------|--|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : ROAD & BRIDGE ENGINEERING |
| COURSE CODE | : 231CE32 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|-----------------|--------|--------|----------------------|----|--------------------|----------------|-------------|-----|-------|-----|---------------------------------|-----|------------------|-----|----------------------------|-----|----------------|
| C L | T L | L L | Self lear ning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | TOTAL | | Based on U.L. & TL Practical | | | | Based on Self- learning | | TOTAL MARKS |
| | | | | | | | Max | Min | Max | Min | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | |
| | | | | | | Max | | | | | Min | Max | Min | Max | Min | Max | |
| 3 | - | 2 | 1 | 3 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | - | - | 25 | 10 | 150 |

II. Rationale

For civil engineers it is necessary to acquire knowledge & skills required to carry investigation, planning, design, construction and maintenance of different works related to roads and bridges.

III. Course Outcomes (COS)

Students should be able to

| | |
|-----|---|
| CO1 | Classify the types of roads and bridges. |
| CO2 | Understand the geometric design, construction and maintenance of roads. |
| CO3 | Study the traffic volume and roadway facilities to cater to the needs of road traffic. |
| CO4 | Know bridge component parts. |
| CO5 | Understand prevailing conditions at bridge site and select a suitable bridge accordingly. |



IV. Course Contents with Specification Table

| SECTION - I | | | | | | | |
|-----------------|--|-------|-------|-----|---------|---------|---------|
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 1 | Roads: | | | | | | |
| 1.1 | Transportation: Modes of transportation, Necessity and Benefits of roads. | | | | | | |
| 1.2 | Classification of roads: location, function, material, traffic. | 05 | 08 | 1,2 | 40% | 40% | 20% |
| 1.3 | Alignment: Alignment and factors affecting it. | | | | | | |
| 1.4 | Typical road cross section: in embankment and cutting. | | | | | | |
| 2 | Surveys, Gradient & Geometric design of Highways: | | | | | | |
| 2.1 | Types: Reconnaissance, Preliminary, Location | | | | | | |
| 2.2 | Camber: definition, purpose, types, IRC specifications. | | | | | | |
| 2.3 | Kerbs: road margin, road formation, right of way, Shoulders | 09 | 12 | 2 | 30% | 50% | 20% |
| 2.4 | Design speed- IRC specification | | | | | | |
| 2.5 | Gradient- definition, types, IRC specification. | | | | | | |
| 2.6 | Sight distances- definition, types, IRC specification | | | | | | |
| 2.7 | Widening of roads on curves. | | | | | | |



| 2.8 | Super elevation- definition, formula for calculating super elevation, minimum and maximum values of super elevation and methods of providing super elevation. | | | | | | |
|-------------------|--|-------|-------|----|---------|---------|---------|
| 2.9 | Problems based on geometric design of road. | | | | | | |
| 3 | Types of pavements: | | | | | | |
| 3.1 | Flexible pavement: components and their functions. | 03 | 06 | 1 | 40% | 40% | 20% |
| 3.2 | Rigid pavement: components and their functions. | | | | | | |
| 3.3 | Pavement design factors. | | | | | | |
| 4 | Road Construction | | | | | | |
| 4.1 | W.B.M. Road: Construction procedure | | | | | | |
| 4.2 | Bituminous Roads: Construction procedure of Bituminous surface types- prime, tack and seal coat, Surface dressing. | 07 | 14 | 2 | 40% | 40% | 20% |
| 4.3 | Cement Concrete Roads: Construction procedure. equipment required. construction joints, joint filter, joint sealer. | | | | | | |
| SECTION-II | | | | | | | |
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 5 | Drainage & Maintenance of roads: | | | | | | |
| 5.1 | Significance and requirements: of highway drainage system. | 09 | 14 | 2 | 40% | 40% | 20% |
| 5.2 | Methods of drainage system: surface and subsurface | | | | | | |



| | | | | | | | |
|---|--|----|----|-----|-----|-----|-----|
| 5.3 | Maintenance of Roads: Necessity, ordinary, routine and periodic maintenance. | | | | | | |
| 5.4 | Strengthening of existing pavement: object of strengthening, types of overlays and its design | | | | | | |
| 6 | Traffic Engineering: | | | | | | |
| 6.1 | Traffic study: volume, Speed study, traffic capacity, PCU. | | | | | | |
| 6.2 | Traffic control devices: Road signs, marking, signals, traffic islands. | 05 | 10 | 3 | 30% | 40% | 30% |
| 6.3 | Road intersections: Intersections at grade and grade separator intersections. | | | | | | |
| 7 | Bridges: | | | | | | |
| 7.1 | Introduction: Definition, Components superstructure, substructure. Economic span of bridge, linear way, water way, afflux, discharge calculations & flood discharge, Catchment area, Scour depth. | 10 | 16 | 4.5 | 40% | 40% | 20% |
| 7.2 | Selection of a bridge site: | | | | | | |
| 7.3 | Types of bridges: Fixed & movable span bridges, temporary bridges. Characteristics, Suitability. | | | | | | |
| 7.4 | Culverts: culverts and types of culverts. | | | | | | |
| Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms' Revised Taxonomy). | | | | | | | |



V. List of Practical:

| Sr. No. | Unit | Practicals/Assignments/Tutorials | Hours | CO |
|---------|------|--|-------|-------|
| 1. | 1 | Tests on aggregates: abrasion, impact and shape test | 2 | 1.3 |
| 2. | 2 | Tests on bitumen-Penetration, Ductility, Softening point test, Viscosity test. | 2 | 1.3 |
| 3. | 3 | Drawing of typical cross section with dimension in embankment and cutting for a) National Highway b) State Highway | 2 | 2.4.5 |
| 4 | 4 | Site Visit Report: Visit to a site for studying maintenance methods of the road | 3 | 1.3 |
| 5 | 5 | Site Visit Report: Visit to a Cement Concrete Road under construction indicating materials construction method and equipments. | 3 | 2.3 |
| 6 | 6 | Site Visit Report: Visit to a Bituminous Road under construction indicating materials, construction method and equipments | 2 | 3.5 |
| 7 | 7 | Drawing of neat labeled sketches of different types of bridges. | 2 | 1.4 |

* Minimum 5 and maximum 7 practicals/experiment/Tutorials sessions to be included in a course term work in a term.

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)

- Practicals/ Assignments / Tutorials
- Midterm Test Exam
- Self-Learning
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam



VII. Text Book, Reference Books and Websites:

| S.N | Author | Title | Publisher and Edition |
|-----|-----------------|--|--|
| 1. | Khanna & Justo. | Highway Engineering | Khanna Publication.2017 |
| 2. | Ponnuswamy S. | Bridge Engineering | McGraw Hill Education .2017 |
| 1. | S.P. Chandola, | A Text Book of Transportation Engineering | S. Chand new Delhi.2014 |
| 2. | IS Codes | IS 2386 part III & IV, IS 6241, IS 1202, IS 1203, IS 1205, IS 1206, IS 1209 | Bureau Of Indian Standards |
| 3. | Websites: | a) http://nptel.ac.in/courses/105101087/2 | b) https://en.wikipedia.org/wiki/Transportation_engineering |

VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|--|---------------------------|---|----------------------------|----------------------------|-------------------------------------|--------|--------|--------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO- 1 | PSO- 2 | PSO- 3 | PSO- 4 |
| CO1 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 1 |
| CO2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 1 | 2 | 1 |
| CO5 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 1 |

Legends: - High:03, Medium:02, Low:01, No Mapping: -


Curriculum Coordinator


Head of the Department


Dean Diploma

BOS approved dated 10/07/2024



| | |
|--------------------------|---------------------------------------|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : SURVEYING |
| COURSE CODE | : 231CE33 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|-----------------|---|---|---------------|----|-----------|--------------------|-------------|-----|-----|-------|------------|----------------------------|---------------|-----|-----|------------------------|-----|-------------|
| C | T | L | Self learning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | | TOTAL | | Based on LL & TL Practical | | | | Based on Self-learning | | TOTAL MARKS |
| | | | | | | | Max | Min | Max | Min | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | | |
| | | | | | | | | | | | Max | Min | Max | Min | Max | Min | | |
| 3 | - | 4 | - | 4 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | 25# | 10 | | | 150 | |

II. Rationale:

The primary objective of this course is to introduce students to the fundamental principles and practices of surveying, a crucial discipline in civil engineering. The ability to conduct accurate surveys is essential for ensuring the reliability and precision of civil engineering projects. By the end of this course, students will possess the necessary knowledge and skills to conduct surveys and create plans and maps that are essential for decision-making in various stages of project development and execution.

III. Course Outcomes:

Students should be able to

| | |
|-----|---|
| CO1 | Understand and explain the foundational principles of surveying and field procedure to conduct the survey |
|-----|---|



| | |
|-----|--|
| CO2 | Record field data using traditional surveying equipment's such as compass, levels and plane table survey |
| CO3 | Interpret and work with contour data, including reading and interpolating contour lines on maps and plans. |
| CO4 | Demonstrate proficiency in using a theodolite for traverse surveying |
| CO5 | Compute areas and volumes from various survey data |

IV. Course Content:

| SECTION-I | | | | | | | |
|-----------------|-----------------------|--|-------|--------|------------|------------|------------|
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | C O | R Level | U Level | A Level |
| 1 | Introduction | 03 | 06 | 1 | 20% | 70% | 10% |
| | 1.1 | Classification and Basic principles of surveying | | | | | |
| | 1.2 | Different types of scales | | | | | |
| | 1.3 | Chain and tape survey | | | | | |
| | 1.4 | Chain and tape correction | | | | | |
| | 1.5 | Conventional symbols and recording of measurements in a field book | | | | | |
| 2 | Compass Survey | 06 | 08 | 2 | 60% | 30% | 10% |
| | 2.1 | Introduction and purpose | | | | | |
| | 2.2 | Principles of compass survey | | | | | |
| | 2.3 | Types of meridians and bearings | | | | | |
| | 2.4 | Types of compasses- Prismatic and Surveyor's compass | | | | | |



| | | | | | | | | |
|----------|-----|--|-----------|-----------|----------|------------|------------|------------|
| | 2.5 | Computation of included angles | | | | | | |
| | 2.6 | Magnetic declination and Local attraction | | | | | | |
| | 2.7 | Plotting and adjusting a traverse | | | | | | |
| | 2.8 | Sources of errors in compass | | | | | | |
| 3 | | Levelling | 11 | 14 | 2 | 60% | 30% | 10% |
| | 3.1 | Definitions and Terms used in leveling | | | | | | |
| | 3.2 | Types of levels and leveling staff | | | | | | |
| | 3.3 | Temporary adjustments of level | | | | | | |
| | 3.4 | Recording and reduction of observations | | | | | | |
| | 3.5 | Computation of RLs by H.I and Rise and fall method | | | | | | |
| | 3.6 | Methods of leveling | | | | | | |
| | 3.7 | Curvature and refraction correction. | | | | | | |
| | 3.8 | Difficulties in leveling | | | | | | |
| | 3.9 | Errors in leveling | | | | | | |
| 4 | | Contouring | 04 | 07 | 3 | 30% | 30% | 40% |
| | 4.1 | Definitions | | | | | | |
| | 4.2 | Object and use of contour map | | | | | | |
| | 4.3 | Characteristics of contour lines | | | | | | |
| | 4.4 | Methods of contouring | | | | | | |



| | | | | | | | | |
|----------------------------|-----|---|--------------|--------------|----------------|--------------------|--------------------|--------------------|
| | 4.5 | Interpolation and sketching of contours | | | | | | |
| | 4.6 | Interpretation of contour sheet | | | | | | |
| SECTION-II | | | | | | | | |
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | C O | R Level | U Level | A Level |
| 5 | | Plane Table Survey | 05 | 06 | 2 | 60% | 30% | 10% |
| | 5.1 | Plane table and its accessories | | | | | | |
| | 5.2 | Temporary adjustment in plane table survey | | | | | | |
| | 5.3 | Orientation of plane table | | | | | | |
| | 5.4 | Methods of plane tabling- radiation, intersection, traversing | | | | | | |
| | 5.5 | Errors and Precautions in plane table survey | | | | | | |
| | 5.6 | Advantages and Disadvantages of plane table survey | | | | | | |
| | 5.7 | Contouring in Plane Table Surveying | | | | | | |
| 6 | | Theodolite and its use | 08 | 11 | 4 | 30% | 30% | 40% |
| | 6.1 | Components of transit theodolite and their functions | | | | | | |
| | 6.2 | Definitions of technical terms used | | | | | | |
| | 6.3 | Procedure to read vernier and micrometer theodolite | | | | | | |



| | | | | | | | |
|----------|---|-----------|-----------|----------|------------|------------|------------|
| 6.4 | Temporary adjustments of transit theodolite | | | | | | |
| 6.5 | Fundamental axis of theodolite and their relationship | | | | | | |
| 6.6 | Measurement of horizontal and vertical angle, | | | | | | |
| 6.7 | Miscellaneous operation with theodolite- prolongation of a straight line, ranging a line, measuring a bearing of line, laying off an angle. measurement of deflection angle | | | | | | |
| 6.8 | Permanent adjustment of theodolite | | | | | | |
| 6.9 | Errors in theodolite | | | | | | |
| 7 | Theodolite Traversing | 07 | 12 | 4 | 30% | 30% | 40% |
| 7.1 | Method of traversing: Included angle method, deflection angle method and fast needle method | | | | | | |
| 7.2 | Traverse computation: consecutive co-ordinates and independent co-ordinates | | | | | | |
| 7.3 | Balancing of traverse: Bowditch rule, transit rule and axis method | | | | | | |
| 7.4 | Gale's traverse table | | | | | | |
| 7.5 | Plotting of a Theodolite traverse | | | | | | |
| 7.6 | Omitted measurements | | | | | | |
| 8 | Computation of Area and Volume | 04 | 06 | 5 | 30% | 40% | 30% |



| | | | | | | | |
|--|--|--|--|--|--|--|--|
| 8.1 | Introduction | | | | | | |
| 8.2 | Computation of area from field notes | | | | | | |
| 8.3 | Methods of computations of area from plotted plan - Trapezoidal rule, Average ordinate rule and Simpson's 1/3 rule | | | | | | |
| 8.4 | Planimeter construction and use (Polar and Digital Planimeter) | | | | | | |
| 8.5 | Zero circle of the Planimeter | | | | | | |
| 8.6 | Methods of computations of volume – Trapezoidal, Prismoidal formula and volume from spot level | | | | | | |
| Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxonomy). | | | | | | | |

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

V. List of Practicals:

| Sr. No. | Unit | Practical/Assignment/ Project | Approx. Hours | CO |
|---------|------|--|---------------|----|
| 1 | 1 | Study of various instruments used for linear measurement and minor instruments | 04 | 1 |
| 2 | 2 | Study of prismatic and surveyor's compass. measurement of bearings, computation of included angles | 04 | 2 |
| 3 | 3 | Study of Dumpy level | 02 | 2 |



| | | | | |
|---|-----|---|---------|-----|
| 4 | 3 | Differential leveling practice, reduction of level by HI and Rise and Fall method, Fly leveling | 04 | 2 |
| 5 | 5 | Plane table methods -Radiation, Intersection and Traversing | 08 | 2 |
| 6 | 6 | Study of Theodolite & Measurement of horizontal angle by method of repetition | 06 | 4 |
| 7 | 6 | Measurement of vertical angle. | 04 | 4 |
| 8 | 6 | Laying of an angle by method of repetition | 04 | 4 |
| 9 | 6 | Prolonging a straight line with the help of Theodolite and Measurement of deflection angle. | 04 | 4 |
| 10 | 8 | To find the area of irregular figures by using Polar and Digital Planimeter | 04 | 5 |
| 11 | 5&7 | Two days project on Theodolite traversing and Plane table detailing | 02 days | 2.4 |
| 12 | | Indian Knowledge System (IKS)-Linear, Angular measurements and Levelling practices | 01 | |
| * Minimum 8 and maximum 12 practical/experiment sessions to be included in a course in a term | | | | |

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals

Term work shall consist record of all Practical and project in field book along with drawing of project work on full imperial drawing sheets.



VII. Text Book, Reference Books and Websites:

| Sr. No. | Author | Title | Publisher and Edition |
|---------|-------------------------------|-------------------------------------|---|
| 1 | N.N. Basak | Surveying and Levelling | Tata McGraw –Hill, 25 th Edition 2008 |
| 2 | Dr.K.R.Arora | Surveying Volume-1 | Standard Book House, 15 th Edition 2015 |
| 3 | S. K. Duggal | Surveying and Levelling Vol. I & II | Tata Mc Graw-Hill, 2 nd Edition |
| 4 | Y.R.Nagaraja & A.Veeraragavan | Surveying Volume-1 | NEM CHAND & BROS, 1 st Edition 1999 |
| 5 | R.Subramanian | Surveying and Levelling | Oxford University Press, 1 st Edition 2007 |
| 6 | Kanetker & Kulkarni | Surveying and Levelling, Vol I &II | Pune Vidyarthi Griha, Pune 24 th Edition |

VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|---|---------------------------|---|----------------------------|----------------------------|-------------------------------------|--------|--------|--------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO- 1 | PSO- 2 | PSO- 3 | PSO- 4 |
| CO1 | 2 | | | 2 | | | | 2 | | | |
| CO2 | 2 | | | 2 | | | | 2 | 1 | | |
| CO3 | 2 | | 2 | 2 | | | | 2 | | | |
| CO4 | 2 | | | 2 | 2 | 2 | | 2 | | 2 | 2 |
| CO5 | 3 | 2 | | | | | | 2 | | | |

Legends: - High:03, Medium:02, Low:01, No Mapping: -


Curriculum Coordinator


Head of the Department


Dean Diploma

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| | |
|-------------------|--------------------------------|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : MECHANICS OF STRUCTURES |
| COURSE CODE | : 231SE34 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | EXAMINATION SCHEME | | | | | | | | | | | | | |
|-----------------|---|---|---------------|-----|--------------------|-------------|-------------|-----|-----|-------|------------|-----------------------------|---------------|-----|-----|------------------------|-----|-------------|
| C | T | L | Self learning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | | TOTAL | | Based on I.L & TL Practical | | | | Based on Self-learning | | TOTAL MARKS |
| | | | | | | | Max | Min | Max | Min | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | | |
| | | | | | | | | | | | Max | Min | Max | Min | Max | Min | Max | |
| 3 | - | 2 | 2 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | - | - | 25 | 10 | 150 | |

@: assessment by Internal Examiner

II. Rationale:

For civil engineers it is necessary to understand stresses developed under the action of different types of forces and to calculate various elastic constants. Drawing AFD, SFD and BMD for a beam enables Civil Engineer positioning reinforcement. Understanding buckling of columns will prepare students to learn design of RCC and Steel Structures later.

III. Course Outcomes (COS)

Students should be able to

| | |
|-----|--|
| CO1 | Interpret different types of forces and corresponding stresses and strains. |
| CO2 | Select appropriate elastic materials and determine their ductility; compute various elastic constants and use their relationships to identify other unknown constants. |



| | |
|-----|--|
| CO3 | Determine shear force and bending moment at a beam section; create shear force and bending moment diagrams, and estimate maximum values and their positions; identify the point of contraflexure. |
| CO4 | Classify short and long columns in industrial structures; determine slenderness ratio and load-carrying capacity of long columns; compare load-carrying capacities using Euler's and Rankine's formulas. |

IV. Course Contents with Specification Table

| SECTION - I | | | | | | | |
|-----------------|---|-------|-----------|---------|------------|------------|------------|
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Mark s | CO S | R Level | U Level | A Level |
| 1 | <p>Simple Stress and Strain</p> <p>Hooke's law, Modulus of elasticity, Modulus of rigidity, Bulk modulus, Poisson's ratio.</p> <p>Simple shear, complementary shear. Relation between E, G and K.</p> <p>Behavior of mild steel under tension, load extension curve, yield stress, factor of safety, working stresses. Stresses in composite sections under axial loading.</p> | 09 | 14 | 1,2 | 21 | 37% | 42 % |
| 2 | <p>Bending moment and shear force in beams</p> <p>Introduction, Types of beams loadings and supports, Shear force in beam, Bending moment, Sign convention, Relationship between</p> | 08 | 11 | 1,3 | 24% | 34% | 42% |



| | loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and Couple. | | | | | | |
|---------------------|--|-------|-------|----|---------|---------|---------|
| 3 | Simple theory of Bending Flexural formula for straight prismatic beams, Principal axes and second moment of area of a section, parallel and perpendicular axes theorem. Application to T and I section. Moment of resistance. Simple problem in application of flexural formula, Flitched beams. | 7 | 10 | 1 | 15% | 32% | 53% |
| SECTION - II | | | | | | | |
| Unit & Sub-Unit | Topics/Sub-topics | Hours | Marks | CO | R Level | U Level | A Level |
| 4 | Torsion of circular shafts Introduction – Pure torsion-torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. | 7 | 11 | 1 | 16% | 37% | 47% |
| 5 | Principal stresses Introduction, Stress components on inclined planes, General two- | 9 | 13 | 1 | 23% | 35% | 42% |



| | | | | | | | |
|---|--|---|----|---|-----|-----|-----|
| | dimensional stress system, Principal planes and stresses and Mohr's circle of stresses | | | | | | |
| 6 | Struts: Euler's theory of struts under axial loads, Its assumption and Limitations Euler's formula, Various End Conditions, effective length, slenderness ratio Rankin's formula, comparison between two formulae and values obtained from them | 8 | 11 | 4 | 26% | 32% | 42% |

V. List of Practical:

| Sr. No. | Unit | Practical/Assignment/Tutorial Title | No. of Hours | Relevant COS |
|---------|------|---|--------------|--------------|
| 1 | 1 | Tension test on M.S. and HYSD (tor) Steel Bar. | 4 | 1 |
| 2 | 2 | Brinell Hardness Test on M.S, C.L & Br specimen | 4 | 1 |
| 3 | 3 | Izod impact test on M.S. bar and brass specimen | 4 | 1,2 |
| 4 | 4 | Torsion test on MS specimen | 4 | 1,2 |
| 5 | 5 | Shear test on M.S. CI brass specimen | 4 | 1,3 |
| 6 | 6.1 | Transverse test on Cast Iron | 4 | 1 |
| 7 | 7.1 | Tension Test on Cast Iron | 4 | 1 |
| 8 | 8.1 | Flexure test on ISMB Section to find modulus of elasticity of steel | 4 | 1,3 |

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)



- Midterm Test Exam
- Term Work
- Practical Work
- Summative Assessment (Assessment of Learning)
- End Term Exam
- Practical exam

VII. Text Book, Reference Books and Websites:

| Sr. No. | Author | Title | Publisher and Edition |
|---------|------------------|------------------------|---|
| 1 | S. Ramamamrutham | Strength of Material | 15 th Edition, 2006 DhanpatRai |
| 2 | S.B.Junnarkar | Mechanics of Structure | 21th Edition 2010 Charotar Publishing House |

VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|---|---------------------------|---|----------------------------|----------------------------|-------------------------------------|--------|--------|--------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO- 1 | PSO- 2 | PSO- 3 | PSO- 4 |
| CO1 | 3 | 3 | 1 | 2 | 1 | - | 1 | 2 | - | - | - |
| CO2 | 3 | 3 | 2 | 2 | - | - | 1 | 2 | - | - | - |
| CO3 | 3 | 3 | 2 | 3 | - | - | 1 | 2 | - | - | - |
| CO4 | 3 | 3 | 1 | 3 | - | - | 1 | 2 | - | - | - |

Legends: - High:03, Medium:02, Low:01, No Mapping: -


Curriculum Coordinator


Head of the Department


Dean Diploma

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| | |
|-------------------|--------------------------------|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : CONCRETE TECHNOLOGY |
| COURSE CODE | : 231SE35 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | EXAMINATION SCHEME | | | | | | | | | | | | | |
|-----------------|--------|--------|----------------------|-----|--------------------|----------------|-------------|-----|-----|-------|------------|-------------------------------|------------------|-----|-----|----------------------------|-----|----------------|
| C L | T L | L L | Self lear ning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | | TOTAL | | Based on LL & TL Practical | | | | Based on Self- learning | | TOTAL MARKS |
| | | | | | | | Max | Min | Max | Min | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | | |
| | | | | | | | | | | | Max | Min | Max | Min | Max | Min | | |
| 3 | 2 | - | 2 | 3.5 | 3 | 30 | 70 | 28 | 100 | 40 | 25 | 10 | - | - | 25 | 10 | 150 | |

II. Rationale

Concrete is the most versatile material of construction, simple to make but most complex to understand. The cement and concrete industry is witnessing a very rapid development day to day and hence the aim of this course is to impart professional/practical knowledge about present knowledge of concrete technology along with recent developments by understanding concrete with facts, concepts and principles.

III. Course Outcomes (COS)

Students should be able to

| | |
|-----|--|
| CO1 | Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregates, admixtures by conducting different tests. |
| CO2 | Carry out field and laboratory tests on concrete in plastic and hardened stage and various concrete operations like mixing, placing, compacting, curing etc. |



| | |
|-----|--|
| CO3 | Produce mix design for nominal grades of concrete as per IS method, understand use of admixtures and their applications. |
| CO4 | Explain special types of concrete; determine the defects in concrete and there remedies, use of equipments to perform Non Destructive tests on concrete. |

IV. Course Contents with Specification Table

| SECTION - I | | | | | | | | |
|-----------------|-----|---|-------|-------|-------------|------------|------------|------------|
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | C O S | R Level | U Level | A Level |
| 1 | 1.1 | Introduction: Definition of Concrete, Advantages of concrete, grades of concrete. | 02 | 17 | 1 | 50% | 25% | 25% |
| | 1.2 | Cement, composition of cement, Types of cement and their uses as per requirements, Tests on cement, field and laboratory tests. | 04 | | 1 | | | |
| | 1.3 | Aggregates and its classification, Different test on aggregates, Strength of aggregates, Bulking of sand, Sieve analysis, Water quality requirements as per I.S. 456-2000. | 06 | | 1 | | | |
| 2 | 2.1 | Properties of Fresh and Hardened Concrete: Properties of Fresh and Hardened concrete, Process diagram of concrete. Workability: Factors affecting workability, Slump test, Compaction factor test and their | 06 | 18 | 2 | 50% | 25% | 25% |



| | | recommended values for placements in various conditions as per I.S 456-2000. | | | | | | |
|---------------------|-----|---|-------|-------|--------|------------|------------|------------|
| | 2.2 | Water Cement Ratio, Bleeding of Concrete, Creep, Shrinkage, Segregation, impermeability, durability of concrete, Elastic properties of concrete, modulus of elasticity of concrete. | 06 | | 2 | | | |
| | 2.3 | Test on Concrete: Compression Test, Cube test, Cylinder Test. | 03 | | 2 | | | |
| SECTION – II | | | | | | | | |
| Unit & Sub-Unit | | Topics/Sub-topics | Hours | Marks | C O | R Level | U Level | A Level |
| 3 | 3.1 | Mix Design: Objectives of Mix Design, Mean strength. Introduction to various methods of mix design, proportioning for normal mix as per I.S. Code methods including problems on mix design. | 06 | 08 | 3 | 40% | 30% | 30% |
| 4 | 4.1 | Special Types of Concrete: Ready Mix Concrete, Precast Concrete, Vacuum Concrete, Shotcrete, Lightweight Concrete, High Performance Concrete, Micro Concrete. Fibre Reinforced Concrete, | 06 | 08 | 3 | 50% | 25% | 25% |



| | | | | | | | | |
|---|-----|---|----|----|---|-----|-----|-----|
| | | Self-Compacting Concrete, Ultra High-Performance Concrete | | | | | | |
| 5 | 5.1 | Admixtures: Chemical admixtures such as plasticizers, Retarders, Accelerators, Water Reducing Admixtures, Water Proofing, Air Entraining, Hot and Cold Weather Concreting | 04 | 06 | 3 | 50% | 25% | 25% |
| 6 | 6.1 | Quality Control of Concrete: Precautions to check quality of concrete during concrete operations. Hand and Machine Mixing and Compaction, Types of Mixers. | 03 | 06 | 2 | 50% | 25% | 25% |
| | 6.2 | Curing of Concrete: Objectives and methods of Curing, Types of Formwork and its Stripping time. | 02 | | 2 | | | |
| 7 | | Concrete for Repair and Rehabilitation: Polymer concrete, Fiber Reinforced concrete, Ferro Cement Concrete, Special tests for concrete used for repairs and rehabilitation. | 03 | 07 | 4 | 50% | 25% | 25% |



V. List of Practical:

| Sr. No. | Practical/Assignment/Tutorial Title | No. of Hours | CO |
|---------|--|--------------|----|
| 1 | Determination of water for cement paste of normal consistency. | 2 | 1 |
| 2 | Determination of Initial and Final Setting time. | 2 | 1 |
| 3 | Verification of Soundness of cement | 2 | 1 |
| 4 | Determination of Fineness of cement by sieving. | 2 | 2 |
| 5 | Determination of compressive strength of cement. | 2 | 2 |
| 6 | Determination of FM of fine and Coarse aggregates | 2 | 2 |
| 7 | Test on Workability: Slump cone test and Compaction Factor test: Effect of W/C and A/C on the tests. | 2 | 2 |
| 8 | Compression test on concrete by cube and cylinder | 2 | 2 |

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Self-learning
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals

VII. Text Book, Reference Books and Websites:

| Sr. No. | Author | Title | Publisher and Edition |
|---------|---------------|---------------------|---|
| 1 | M.L. Gambhir, | Concrete Technology | McGraw Hill Book Company, Fifth Edition. 2017. |
| 2 | M.S. Shetty | Concrete Technology | Sixth Edition 2018 S. Chand Publication. |



| | | | |
|---|--------------|------------------------|---|
| 3 | A.M. Neville | Properties of Concrete | Pearson Publication, London, 2012 |
| 4 | Web sites | www.youtube.com | Many publishers on different topics covering almost entire syllabus |

VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|---|---------------------------|---|----------------------------|----------------------------|-------------------------------------|-------|-------|-------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 | PSO-4 |
| CO1 | 2 | - | 1 | 2 | 2 | - | 2 | 2 | 1 | 2 | 2 |
| CO2 | 2 | - | 1 | 2 | 2 | - | 2 | 2 | 1 | 2 | 2 |
| CO3 | 3 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 |

Legends: - High:03, Medium:02, Low:01, No Mapping: -


Curriculum Coordinator


Head of the Department


Dean Diploma

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| | |
|--------------------------|---------------------------------------|
| DIPLOMA PROGRAMME | : DIPLOMA IN CIVIL ENGINEERING |
| PROGRAMME CODE | : DCE |
| SEMESTER | : THIRD |
| COURSE TITLE | : COMPUTER -AIDED DRAWING |
| COURSE CODE | : 231CE36 |

I. Teaching, Learning and Examination Scheme:

| TEACHING SCHEME | | | | | EXAMINATION SCHEME | | | | | | | | | | | | |
|-----------------|---|---|---------------|----|--------------------|-------------|-------------|-----|-------|-----|----------------------------|-----|---------------|-----|------------------------|-----|-------------|
| C | T | L | Self learning | CR | PAPER HRS | FA-TH (MST) | SA-TH (ESE) | | TOTAL | | Based on LL & TL Practical | | | | Based on Self-learning | | TOTAL MARKS |
| | | | | | | | | | | | FA-PR (CA) | | SA-PR (PR/OR) | | SLA | | |
| | | | | | | | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | |
| - | - | 4 | | 2 | 3 | - | - | - | - | - | 50 | 20 | 50# | 20 | - | - | 100 |

#: assessment by External Examiner

II. Rationale

This course aims to provide students with the foundational knowledge and practical skills for Two-dimensional (2D) and Three-dimensional (3D) Computer-Aided Design (CAD), focusing on applications relevant to civil engineering. The primary goal is to enable students to develop proficiency in creating 2D civil engineering drawings for buildings and 3D drawings for simple objects.

III. Course Outcomes (COS)

Students should be able to

| | |
|-----|---|
| CO1 | Interpret the fundamental concepts and usage of CAD software. |
| CO2 | Configure a CAD workstation and demonstrate proficiency in basic CAD commands |
| CO3 | Apply basic CAD commands to develop 2D drawings of residential building by CAD software |
| CO4 | Apply basic CAD command to develop 3D drawings of residential building using CAD software |



IV. Course Contents with Specification Table

| Unit & Sub-Unit | | Topics/Sub-topics |
|-----------------|-----|---|
| 1 | | Introduction to CAD |
| | 1.1 | Definition, Usage & Application to the Industry, Merits & Demerits |
| | 1.2 | Various drawing software available in market: AutoCAD, ZWCAD, Felix Cad, Auto Civil, 3D Max, Libre CAD etc. |
| | 1.3 | Starting up with AutoCAD, Introduction of the user interface (Tool Bars, Drop down menus, Command line), Opening & Saving of a CAD file at the desired location. |
| 2 | | Demonstration of commands in CAD |
| | 2.1 | WCS icon, UCS icon, co-ordinates, drawing limits, introduction to various modes like grid, snap ortho, polar etc |
| | 2.2 | Drawing commands: line, polyline, multiline, circle, rectangle, ellipse, polygon etc. |
| | 2.3 | Editing commands: Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. |
| | 2.4 | Working with hatches, fills, various types of dimensioning, text, match properties etc. |
| 3 | | Developing 2D drawings of Buildings and Culvert/ Bridge |
| | 3.1 | Generation of a line plan |
| | 3.2 | Drawing a detailed Plan, elevation, section for a residential bungalow along with site plan, Area statement & Name plate. Print/Plot the drawings using Plot setting. |
| | 3.3 | Drawing a detailed Plan, elevation, section for residential/ commercial building along with site plan, Area statement & Name plate. Print/Plot the drawings using Plot setting. |
| | 3.4 | Drawing of Culvert/ Bridge |
| 4 | | Developing 3D drawings of objects |



| | | |
|--|-----|--|
| | 4.1 | Develop isometric drawings of Simple Objects such as Steps, Footings etc. Print/ Plot the above drawings using Plot Settings |
| | 4.2 | Develop a 3D Model for a Single Room Building |

V. List of Practical:

| Sr. No. | Unit | Practical/Assignment/ Project | Approx. Hours | C O | R Level | U Level | A Level |
|---------|------|---|---------------|-----|---------|---------|---------|
| 1 | 1 | Introduction of the user interface, Usage of various CAD commands. | 8 | 1,2 | 30% | 40% | 30% |
| 2 | 2 | Draw a basic 2D objects | 8 | 1,2 | 10% | 10% | 80% |
| 3 | 2 | Draw a line plan for residential building | 6 | 3 | 10% | 10% | 80% |
| 4 | 3 | Draw following drawing for a residential bungalow 1.Plan 2.Elevation 3.Sections (Two) 4.Site plan 5. Area Statement and Schedule 6. Title Block | 10 | 3 | 10% | 10% | 80% |
| 5 | 3 | Draw following drawing for a G+2 residential/ commercial building 1.Plan 2.Elevation 3.Sections (Two) 4.Site plan 5. Area Statement and Schedule 6. Title Block | 10 | 3 | 10% | 10% | 80% |



| | | | | | | | |
|---|---|---|---|---|-----|-----|-----|
| 6 | 3 | Draw a Plan, Cross section & longitudinal section of a Culvert (Pipe/ Box Culvert) or a Concrete bridge | 8 | 3 | 10% | 10% | 80% |
| 7 | 4 | Develop isometric drawings of simple objects such as steps, footings etc. | 6 | 4 | 10% | 10% | 80% |
| 8 | 4 | Develop a 3D model for a single room building | 8 | 4 | 10% | 10% | 80% |

VI. Assessments Methodologies /Tools

Formative assessment (Assessment for Learning)

- Term Work

Students should submit the file folder containing the print outs of all the above-mentioned drawings.

Summative Assessment (Assessment of Learning)

- Practical Exam

VII. Text Book, Reference Books and Websites:

| Sr. No. | Author | Title | Publisher and Edition |
|---------|--|--|--|
| 1. | Dr M.A.Jayaram, D.S.Rajendra Prasad | CAD in Civil Engineering a Laboratory Referral | Sapna Book House |
| 2. | - | AutoCAD Manual | Microsoft Autodesk |
| 3. | Sham Tickoo | AutoCAD – A problem solving Approach – 2013 & Beyond | Cengage Learning; 1 st edition (September 21, 2012) |
| 4. | M. N. Sesha Prakash & Dr. G. S. Servesh | Computer Aided Design Laboratory | Laxmi Publications. |
| 5. | Websites | www.cadlearning.com | www.cadopolis.com/autocad-tutor.html |



VIII. Suggested Cos-Pos Matrix Form

| Course Outcomes (CO) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | | |
|----------------------|---|--------------------------|---|---------------------------|---|----------------------------|----------------------------|-------------------------------------|--------|--------|--------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO- 1 | PSO- 2 | PSO- 3 | PSO- 4 |
| CO1 | 2 | | | | | | | 2 | 1 | | |
| CO2 | 2 | | | | | | | 2 | 2 | | |
| CO3 | 2 | | 2 | 2 | | | | 2 | 3 | | 2 |
| CO4 | 2 | | 2 | 2 | | | | 2 | 3 | | 2 |

Legends: - High:03, Medium:02, Low:01, No Mapping: -


Curriculum Coordinator


Head of the Department


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