## *II Semester Scheme of Studies - Diploma in Civil Engineering [C-20]*

| Sl. No | Course Category / Teaching Department | Course Code | Course Title | Hours per week | | | Total contact hrs/week | Credits | CIE Marks | | SEE Marks | | Total Marks | Min Marks for Passing (including CIE) | Assigned Grade | Grade Point | SGPA and CGPA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | Max | Min | Max | Min | | | | | |
| **THEORY COURSES** | | | | | | | | | | | | | | | | | SGPA & CGPA of 2nd Semester |
| 1 | BS/SC | 20SC01T | Engineering Mathematics | 4 | 0 | 0 | 4 | 4 | 50 | 20 | 50 | 20 | 100 | 40 | | | |
| 2 | SC/CE | 20PM01T | Project Management Skills | 6 | 0 | 0 | 6 | 4 | 50 | 20 | 50 | 20 | 100 | 40 | | | |
| **PRACTICAL COURSES** | | | | | | | | | | | | | | | | | |
| 3 | ES/CE | 20CE21P | Civil Engineering Graphics | 2 | 0 | 4 | 6 | 4 | 60 | 24 | 40 | 16 | 100 | 40 | | | |
| 4 | ES/CE | 20CE22P | Basic Surveying | 2 | 0 | 4 | 6 | 4 | 60 | 24 | 40 | 16 | 100 | 40 | | | |
| 5 | ES/EE | 20EE01P | Fundamentals of Electrical & Electronics Engineering | 2 | 0 | 4 | 6 | 4 | 60 | 24 | 40 | 16 | 100 | 40 | | | |
| **AUDIT COURSES** | | | | | | | | | | | | | | | | | |
| 6 | AU/KA | 20KA21T | Kannada-I/ಸಾಹಿತ್ಯಸಿಂಚನ – I /ಬಳಕೆ ಕನ್ನಡ - I | 2 | 0 | 0 | 2 | 2 | 50 | 20 | - | - | 50 | 20 | | | |
| **Total** | | | | **18** | **0** | **12** | **30** | **22** | **330** | **132** | **220** | **88** | **550** | **220** | | | |

T:- Theory P:- Practical D:- Drawing E:- Elective BS- Basic Science:: ES-Engineering Science:: HS-Humanities & Social Science:: AU-Audit Course:: EG: English ::SC: Science

**Note:**

1. Assigned Grade, Grade Point, SGPA and CGPA to be recorded in the Grade/Marks card.
2. Theory course Semester End Examination (SEE) is conducted for 100 marks ( 3 Hours duration)
3. Practical course CIE and SEE is conducted for 100 marks (3 Hours duration)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CO5** | Different renewable energy resources and efficient process of harvesting. | 1,5,7 | R,U | 07 | 03 | 02 | 05 |
| **CO6** | Solid Waste Management and Environmental acts. | 1,5,7 | R,U | 05 | 02 | 04 | 06 |
| **Total Hours of instruction** | | | | **26** | **30** | | |

R-Remember; U-Understanding.

## Level of Mapping PO's with CO's

| Course | CO's | Programme Outcomes (PO's) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **Environmental Science** | **CO1** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |
| | **CO2** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |
| | **CO3** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |
| | **CO4** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |
| | **CO5** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |
| | **CO6** | 3 | 0 | 0 | 0 | 2 | 0 | 1 |

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped**

Method is to relate the level of PO with the number of hours devoted to the CO s which maps the given PO.
If ≥50% of classroom sessions related to the CO are addressing a particular PO, it is considered that PO is mapped at Level 3
If 30 to 50% of classroom sessions related to the CO are addressing a particular PO, it is considered that PO is mapped at Level 2
If 5 to 30% of classroom sessions related to the CO are addressing a particular PO, it is considered that PO is mapped at Level 1
If < 5% of classroom sessions related to the CO are addressing a particular PO, it is considered that PO is considered not mapped i.e. Level 0

## Course Assessment and Evaluation Chart

| Sl. No | Assessment | Duration | Max marks | Conversion |
|---|---|---|---|---|
| 1. | CIE Assessment 1 ( Written Test -1 - At the end of 3 d week | 80 minutes | 30 | Average of three written tests 30 |
| 2. | CIE Assessment 2 (Written Test -2) - At the end of 7 week | 80 minutes | 30 | |
| 3. | CIE Assessment 3 (Written Test -3) - At the end of 13 week | 80 minutes | 30 | |
| 4 | CIE Assessment 4 (MCQ/Quiz) - At the end of 5 week | 60 minutes | 20 | Average of three 20 |
| 5 | CIE Assessment 5 ( Open book Test) - At the end of 9 week | 60 minutes | 20 | |
| 6 | CIE Assessment 6 (Student activity/Assignment)- At the end of 11 week | 60 minutes | 20 | |
| 7. | Total Continuous Internal Evaluation (CIE) Assessment | | | 50 |
| **Total Marks** | | | | **50** |

**Note:**

1. Average marks of Three CIE shall be rounded off to the next higher digit.
2. Assessment of assignment and student activity is evaluated through appropriate rubrics by the respective course coordinator. The secured mark in each case is rounded off to the next higher digit.

**MANDATORY STUDENT ACTIVITY: EACH STUDENT HAS TO SELECT ANY ONE OF THE LISTED**

1. Students chose one thing to reduce at home each week and write journal entries about their successes and challenges implementing the change. In class, they form groups and create "Do You Know?" posters.
2. Students pretend they are architects, and come up with a series of design changes to make their school more environmentally friendly. They then grade their projects according to a rubric.
3. A presentation for Green Team Club members to introduce themselves and the purpose of their club. They explain how to use their new recycling bins, in the classroom and in the cafeteria.
4. Ever wonder what's in your school's waste? This hands-on activity helps students assess their school's waste in order to think of ways to reduce it. The results can be incorporated into the school's recycling plan.
5. How do we measure climate change? What activities contribute to climate change?
6. 6. Start a compost or worm bin. Composting is a hands-on way to learn about important life science concepts such as ecosystems, food webs and biodegradation. Students experience how worms and other decomposers recycle fruits and vegetable scraps into compost. Use the compost in your college garden! Have green team students make up a skit and present details about the new composting program to all classrooms. Have them make signs for the bins (compost, recycle, and landfill), monitor the waste collection at lunchtime, cart the food waste to the compost, and decide how and where the compost will be used.
7. Paint posters and decorate bulletin boards or the doors to the cafeteria with waste- free lunch messages to announce or support a waste-free event, and have students vote for their favorite poster.
8. Conduct a classroom audit to identify waste and look for ideas to reduce and reuse. Empower the student to set goals, search for solutions and review progress.
9. Go on a field trip. Visit your local landfill, recycling center, or a nearby composing facility where the students can see first-hand what is happening to waste, and learn about the lifecycle of waste and its affect on the environment.
10. Home energy audit:Have students make a list of all the appliances and light bulbs in their house. How much energy does their house use if all the lights are on for 4 hours per day? If their appliances are on for 2 hours per day? How much energy could they save if they switched to energy-efficient appliances or light bulbs?
11. Use recycled material in art projects:Recycled materials can make beautiful art projects such as jewelry, planters, and bird houses. Incorporating materials that would otherwise be thrown away into art projects can show your students how to find new uses for these items.
12. Life cycle :One way to show students what happens when you put something in the trash versus recycling or reusing the object is to do a life cycle analysis. This is a flow chart that shows the environmental impacts of an object, from extracting the raw materials to decomposition and everything in between. When something is put in the trash instead of

being reused or recycled, the life cycle assessment will show a bigger environmental impact. When something is reused or recycled, the environmental impact is less because raw materials don't need to be extracted to create something new.

**Model Question Paper**
**I A Test (CIE)**

| | | | | | |
|---|---|---|---|---|---|
| **Programme :** | | | | | **Semester: I** |
| **Course :** | | | | | **Max Marks : 30** |
| **Course Code :** | | | | | **Duration : 1 Hr 20 minutes** |
| **Name of the course coordinator:** | | | | | **Test : I/II/III** |
| Note: Answer one full question from each section. One full question carries 10 marks. | | | | | |
| **Qn.No** | **Question** | **CL** | **CO** | **PO** | **Marks** |
| | **Section-1** | | | | |
| 1.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 2.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| | **Section-2** | | | | |
| 3.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 4.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| | **Section-3** | | | | |
| 5.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 6.a) | | | | | |
| b) | | | | | |
| c) | | | | | |

**Government of Karnataka**
**Department of Collegiate and Technical Education**
**Board of Technical Examinations, Bangalore**

| | | | |
|---|---|---|---|
| **Course Code** | 20SC01T | **Semester** | I/II |
| **Course Title** | **ENGINEERING MATHEMATICS** | **Course Group** | Core |
| **No. of Credits** | 4 | **Type of Course** | Lecture |
| **Course Category** | Theory | **Total Contact Hours** | 4Hrs Per Week |
| | | | 52Hrs Per Semester |
| **Prerequisites** | 10 Level Mathematics | **Teaching Scheme** | (L:T:P) = 4:0:0 |
| **CIE Marks** | 50 | **SEE Marks** | 50 |

## RATIONALE

Engineering Mathematics specification provides students with access to important mathematical ideas to develop the mathematical knowledge and skills that they will draw on in their personal and work lives. The course enable students to develop mathematical conceptualization, inquiry, reasoning, and communication skills and the ability to use mathematics to formulate and solve problems in everyday life, as well as in mathematical contexts. At this level, the mathematics curriculum further integrates the three content areas taught in the higher grades into three main learning areas: Algebra; Measurement of angles and Trigonometry and Calculus.

## 1. COURSE SKILL SET

*Student will be able to:*

1. Solve system of linear equations arise in different engineering fields
2. Incorporate the knowledge of calculus to support their concurrent and subsequent engineering studies
3. Adept at solving quantitative problems
4. Ability to understand both concrete and abstract problems
5. Proficient in communicating mathematical ideas
6. Detail-oriented

## 2. COURSE OUT COMES

*At the end of the course, student will be able to*

| | |
|---|---|
| **CO1** | Determine the inverse of a square matrix using matrix algebra. Apply the concepts of matrices and determinants to solve system of linear equations and find eigen values associated with the square matrix. |
| **CO2** | Find the equation of straight line in different forms. Determine the parallelism and perpendicularity of lines. |
| **CO3** | Calculate trigonometric ratios of allied angles and compound angles. Transform sum or difference of trigonometric ratios into product and vice versa. |

| | |
|---|---|
| **CO4** | Differentiate various continuous functions and apply the concept in real life situations. |
| **CO5** | Integrate various continuous functions and apply the concept in evaluating the area and volume through definite integrals. |

## 3. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS

| UNIT NO | UNIT TITLE | TEACHING HOURS | DISTRIBUTION(THEORY) | | | |
|---|---|---|---|---|---|---|
| | | | R LEVEL | U LEVEL | A LEVEL | TOTAL |
| 1 | Matrices and Determinants | 10 | 8 | 20 | 12 | 40 |
| 2 | Straight lines | 10 | 8 | 20 | 12 | 40 |
| 3 | Trigonometry | 10 | 8 | 20 | 12 | 40 |
| 4 | Differential Calculus and applications | 11 | 8 | 20 | 12 | 40 |
| 5 | Integral Calculus and applications | 11 | 8 | 20 | 12 | 40 |
| | **Total** | 52 | 40 | 100 | 60 | **200** |

**Legends:** R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

## 4. DETAILS OF COURSE CONTENT

*The following topics/subtopics is to be taught and assessed in order to develop Unit Skill sets for achieving CO to attain identified skill sets.*

| UNIT NO | Unit skill set (In cognitive domain) | Topics/Subtopics | Hours L-T-P |
|---|---|---|---|
| **UNIT-1 MATRICES AND DETERMINANTS** | ➢ Use algebraic skills which are essential for the study of systems of linear equations, matrix algebra and eigen values | 1.1 Matrix and types<br>1.2 Algebra of Matrices (addition, subtraction, scalar multiplication and multiplication)<br>1.3 Evaluation of determinants of a square matrix of order 2 and 3. Singular matrices<br>1.4 Cramer's rule for solving system of linear equations involving 2 and 3 variables<br>1.5 Adjoint and Inverse of the non-singular matrices of order 2 and 3<br>1.6 Characteristic equation and Eigen values of a square matrix of order 2 | 10-0-0 |

| | | | |
|---|---|---|---|
| **UNIT-2 STRAIGHT LINES** | ➢ Able to find the equation of a straight line in different forms<br>➢ Determine whether the lines are parallel or perpendicular | 2.1 Slope of a straight line<br>2.2 Intercepts of a straight line<br>2.3 Intercept form of a straight line<br>2.4 Slope-intercept form of a straight line<br>2.5 Slope-point form of a straight line<br>2.6 Two-point form of a straight line<br>2.7 General form of a straight line<br>2.8 Angle between two lines and conditions for lines to be parallel and perpendicular<br>2.9 Equation of a straight line parallel to the given line<br>2.10 Equation of a straight line perpendicular to the given line | 10-0-0 |
| **UNIT-3 TRIGONOMETRY** | ➢ Use basic trigonometric skills in finding the trigonometric ratios of allied and compound angles<br>➢ Able to find all the measurable dimensions of a triangle | 3.1 Concept of angles, their measurement, Radian measure and related conversions.<br>3.2 Signs of trigonometric ratios in different quadrants (ASTC rule)<br>3.3 Trigonometric ratios of allied angles (definition and the table of trigonometric ratios of standard allied angles say $90^0 \pm \Theta$, $180^0 \pm \Theta$, $270^0 \pm \Theta$ and $360^0 \pm \Theta$)<br>3.4 Trigonometric ratios of compound angles (without proof)<br>3.5 Trigonometric ratios of multiple angles<br>3.6 Transformation formulae | 10-0-0 |
| **UNIT-4 DIFFERENTIAL CALCULUS AND APPLICATIONS** | ➢ Able to differentiate algebraic, exponential, trigonometric, logarithmic and composite functions<br>➢ Able to find higher order derivatives<br>➢ Understand and work with derivatives as rates of change in mathematical models<br>➢ Find local maxima and minima of a function | 4.1 Derivatives of continuous functions in an interval (List of formulae)<br>4.2 Rules of differentiation<br>4.3 Successive differentiation (up to second order)<br>4.4 Applications of differentiation | 11-0-0 |
| **UNIT-5 INTEGRAL CALCULUS AND APPLICATIONS** | ➢ Understand the basic rules of integration and Evaluate integrals with basic integrands.<br>➢ Identify the methods to evaluate integrands<br>➢ Apply the skills to evaluate integrals representing areas and volumes | 5.1 List of standard integrals and Basic rules of integration<br>5.2 Evaluation of integrals of simple function and their combination<br>5.3 Methods of integration<br>5.4 Concept of definite integrals<br>5.5 Applications of definite integrals | 11-0-0 |

## 5. MAPPING OF CO WITH PO

| CO | Course Outcome | PO Mapped | UNIT Linked | CL R/U/A | Theory in Hrs | TOTAL |
|---|---|---|---|---|---|---|
| **CO1** | Determine the inverse of a square matrix using matrix algebra. Apply the concepts of matrices and determinants to solve system of linear equations and find eigen values associated with the square matrix. | 1, 7 | 1 | R/U/A | 10 | **40** |
| **CO2** | Find the equation of straight line in different forms. Determine the parallelism and perpendicularity of lines. | 1, 7 | 2 | R/U/A | 10 | **40** |
| **CO3** | Calculate trigonometric ratios of allied angles and compound angles. Transform sum (difference) of trigonometric ratios into product and vice versa. | 1, 7 | 3 | R/U/A | 10 | **40** |
| **CO4** | Differentiate various continuous functions and apply the concept in real life situations. | 1, 3, 7 | 4 | R/U/A | 11 | **40** |
| **CO5** | Integrate various continuous functions and apply the concept in evaluating the area and volume through definite integrals. | 1, 3, 7 | 5 | R/U/A | 11 | **40** |
| | | | | | **52** | **200** |

| Course | CO's | Programme Outcomes (PO's) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| ENGINEERING MATHEMATICS | CO1 | 3 | 1 | 0 | 0 | 0 | 0 | 3 |
| | CO2 | 3 | 1 | 0 | 0 | 0 | 0 | 3 |
| | CO3 | 3 | 1 | 0 | 0 | 0 | 0 | 3 |
| | CO4 | 3 | 1 | 3 | 0 | 0 | 0 | 3 |
| | CO5 | 3 | 1 | 3 | 0 | 0 | 0 | 3 |
| **Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped** | | | | | | | | |

## 7. INSTRUCTIONAL STRATEGY

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes

1. Explicit instruction will be provided in intervention classes or by using different differentiation strategies in the main classroom.
2. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching method and media that are employed to develop the outcomes.
3. Observing the way their more proficient peers use prior knowledge to solve current challenges and persevere in problem solving will help struggling students to improve their approach to engaging with rich contextual problems.
4. Ten minutes a day in homeroom, at the end of class, or as a station in a series of math activities will help students build speed and confidence.
5. Topics will be introduced in a multiple representation.
6. The teacher is able to show different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. In a perfect world, teacher would always be able to demonstrate how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. When a concept cannot be applied in that manner, we can still share how it might be applied within mathematics.

## 8. SUGGESTED LEARNING RESOURCES:

| Sl. No. | Author | Title of Books | Publication/Year |
|---|---|---|---|
| **1** | B.S. Grewal | Higher Engineering Mathematics | Khanna Publishers, New Delhi, 40th Edition,2007 |
| **2** | G. B. Thomas, R. L. Finney | Calculus and Analytic Geometry | Addison Wesley, 9th Edition, 1995 |
| **3** | S.S. Sabharwal, Sunita Jain, Eagle Parkashan | Applied Mathematics, Vol. I & II | Jalandhar. |
| **4** | Comprehensive Mathematics | Comprehensive Mathematics Vol. I & II | Laxmi Publications, Delhi |
| **5** | ReenaGarg &Chandrika Prasad | Advanced Engineering Mathematics | Khanna Publishing House, New Delhi |

## 9. COURSE ASSESSMENT AND EVALUATION CHART

| Sl.No. | Assessment | Duration | Max marks | Conversion |
|---|---|---|---|---|
| 1 | CIE Assessment 1 (Written Test -1) At the end of 3 d week | 80 minutes | 30 | Average of three written tests 30 |
| 2 | CIE Assessment 2 (Written Test -2) At the end of 7 week | 80 minutes | 30 | |
| 3 | CIE Assessment 3 (Written Test -3) At the end of 13 week | 80 minutes | 30 | |
| 4 | CIE Assessment 4 (MCQ/Quiz) At the end of 5 week | 60 minutes | 20 | Average of three 20 |
| 5 | CIE Assessment 5 (Open book Test) At the end of 9 week | 60 minutes | 20 | |
| 6 | CIE Assessment 6 (Student activity/Assignment) At the end of 11 week | 60 minutes | 20 | |
| Total Continuous Internal Evaluation (CIE) Assessment | | | | **50** |
| 8 | Semester End Examination (SEE) Assessment (Written Test) | 3 Hours | 100 | **50** |
| **Total Marks** | | | | **100** |

**Note:**

1. SEE (Semester End Examination) is conducted for 100 Marks theory courses for a time duration of 3 Hours.
2. Three CIE (written test), each of 30 marks for a time duration of 80 minutes shall be conducted. Also, three CIE (MCQ or Quiz/Open book test/student activity or assignment) each of 20 marks for the time duration of 60 minutes shall be conducted. Any fraction at any stage during evaluation will be rounded off to the next higher digit
3. Assessment of assignment and student activity is evaluated through appropriate rubrics by the respective course coordinator. The secured mark in each case is rounded off to the next higher digit.

## 10 DETAILED COURSE CONTENT

| UNIT NO AND NAME | DETAILED COURSE CONTENT | CO | PO | CONTACT HRS | TOTAL |
|---|---|---|---|---|---|
| 1 MATRICES AND DETERMINANTS | Definition and types of matrices | 1 | 1,7 | 1 | 10 |
| | Algebra of Matrices (addition, subtraction and scalar multiplication) problems | 1 | 1,7 | 1 | |
| | Multiplication of Matrices(problems) | 1 | 1,7 | 1 | |
| | Evaluation of 2x2 ,3x3 determinants and Singular matrices and problems in finding unknown variable | 1 | 1,7 | 1 | |
| | Cramer's rule to solve system of linear equation with 2 and 3 variables | 1 | 1,7 | 1 | |
| | Cramer's rule to solve system of linear equation with 2 and 3 variables.problems | 1 | 1,7 | 1 | |
| | Minors, Cofactors of elements of square matrices of order 2 and 3 | 1 | 1,7 | 1 | |
| | Adjoint of a square matrix(2x2 and 3x3),Inverse of a non singular square matrix | 1 | 1,7 | 1 | |
| | Adjoint of a square matrix(2x2 and 3x3),Inverse of a non singular square matrix and problems | 1 | 1,7 | 1 | |
| | Characteristic equation and eigen values of a 2x2 matirx and problems | 1 | 1,7 | 1 | |
| 2 STRAIGHTLINES | Slope of the straight line(provided with inclination and two points on the line as well) and problems | 2 | 1,7 | 1 | 10 |
| | Intercepts of a straight line and problems | 2 | 1,7 | 1 | |
| | Intercept form of a straight line and problems | 2 | 1,7 | 1 | |
| | Slope-intercept form of a straight line and problems | 2 | 1,7 | 1 | |
| | Slope-point form of the straight line and problems | 2 | 1,7 | 1 | |
| | Two-point form of a straight line and problems | 2 | 1,7 | 1 | |
| | General form of a straight line.problems on finding slope and intercepts. | 2 | 1,7 | 1 | |
| | Angle between two straight lines and conditions for the lines to be parallel and perpendicular and problems | 2 | 1,7 | 1 | |
| | Equation of a line parellel to the given line and problems | 2 | 1,7 | 1 | |
| | Equation of a line perpendicular to the given line.problems | 2 | 1,7 | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| 3 TRIGONOMETRY | Concept of angles and their measurement. Radian measures and related conversions (degree to radian and vice-versa) and problems | 3 | 1,7 | 1 | 10 |
| | Signs of trigonometric ratios in different quadrants (ASTC rule) | 3 | 1,7 | 1 | |
| | Trigonometric ratios of allied angles (definition and the table of trigonometric ratios of standard allied angles say $90^0 \pm \theta$, $180^0 \pm \theta$, $270^0 \pm \theta$ and $360^0 \pm \theta$) | 3 | 1,7 | 1 | |
| | Problems on allied angles. (proving identities) | 3 | 1,7 | 1 | |
| | Problems on allied angles. (Finding values of x in an identity) | 3 | 1,7 | 1 | |
| | Trigonometric ratios of compound angles (without proof) | 3 | 1,7 | 1 | |
| | Trigonometric ratios of multiple angles (sin2A, cos2A, tan2A, sin3A, cos3A and tan3A) | 3 | 1,7 | 1 | |
| | Problems on multiple angles sin2A, cos2A, tan2A, sin3A, cos3A and tan3A | 3 | 1,7 | 1 | |
| | Transformation formulae (without proof) as sum to product. (Simple problems) | 3 | 1,7 | 1 | |
| | Transformation formulae (without proof) as product to sum. (Simple problems) | 3 | 1,7 | 1 | |
| 4 DIFFERENTIAL CALCULUS AND APPLICATIONS | Definition of a derivative of a function. Listing the derivatives of standard functions. (Algebraic, trigonometric, exponential, logarithmic and inverse trigonometric functions) | 4 | 1,3,7 | 1 | 11 |
| | Addition and subtraction rule of differentiation and problems | 4 | 1,3,7 | 1 | |
| | Product rule and quotient rule of differentiation and problems | 4 | 1,3,7 | 1 | |
| | Product rule and quotient rule of differentiation and problems | 4 | 1,3,7 | 1 | |
| | Composite functions and their derivatives. (CHAIN RULE) | 4 | 1,3,7 | 1 | |
| | Composite functions and their derivatives. (CHAIN RULE). Problems | 4 | 1,3,7 | 1 | |
| | Successive differentiation up to second order | 4 | 1,3,7 | 1 | |
| | Slope of the tangent and normal to the given curve and their equations and problems | 4 | 1,3,7 | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| | Rate measure: velocity and acceleration at a point of time and problems | **4** | **1,3,7** | **1** | |
| | Local Maxima and Minima of a function | **4** | **1,3,7** | **1** | |
| | Local Maxima and Minima of a function. Problems | **4** | **1,3,7** | **1** | |
| **5 INTEGRAL CALCULUS AND APPLICATIONS** | Definition of an indefinite integral. Listing the Integrals of standard functions. (Algebraic, trigonometric, exponential, logarithmic and inverse trigonometric functions) | **5** | **1,3,7** | **1** | 11 |
| | Rules of Integration. Evaluation of integrals with simple integrands and their combinations | **5** | **1,3,7** | **1** | |
| | Rules of Integration. Evaluation of integrals with simple integrands and their combinations. Problems | **5** | **1,3,7** | **1** | |
| | Evaluation of integrals with simple integrands and their combinations. Problems | **5** | **1,3,7** | **1** | |
| | Evaluation of integrals by Substitution method | **5** | **1,3,7** | **1** | |
| | Evaluation of integrals by Integration by parts | **5** | **1,3,7** | **1** | |
| | Evaluation of integrals by Integration by parts. Problems | **5** | **1,3,7** | **1** | |
| | Definition of definite integrals and their evaluation | **5** | **1,3,7** | **1** | |
| | Evaluation of Definite integrals. Problems | **5** | **1,3,7** | **1** | |
| | Area enclosed by the curves by integral method | **5** | **1,3,7** | **1** | |
| | Volume generated by the curve rotated about an axis by integral method | **5** | **1,3,7** | **1** | |

# First Semester Examination, Model Question Paper – 2020

# Engineering Mathematics

**Duration: 3Hours]** **Subject Code: 20SC01T** **[ Max. Marks:100**

**Instruction:** Answer one full question from each section. One full question carries 20 marks.

## SECTION – 1

**1**

**a** If the matrix $\begin{bmatrix} 2 & 4 & 6 \\ 2 & x & 2 \\ 6 & 8 & 14 \end{bmatrix}$ is singular then find $x$ . **4**

**b** Find the $A^2$ for the matrix $\begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 1 \\ 0 & 3 & 3 \end{bmatrix}$. **5**

**c** Solve $2x - y = 3$ and $x + 2y = 4$ by using determinant method. **5**

**d** Find the inverse ofthe matrix $\begin{bmatrix} 2 & 3 & 1 \\ -1 & 2 & 1 \\ 5 & 4 & 3 \end{bmatrix}$. **6**

**2**

**a** If $A = \begin{bmatrix} 2 & -1 \\ 4 & 0 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -3 & 4 \\ -1 & -1 & 1 \\ 0 & 4 & 2 \end{bmatrix}$ then find $(AB)^T$. **4**

**b** Verify whether AB=BA for the matrices $A = \begin{bmatrix} 1 & 0 & 5 \\ -1 & 2 & 1 \\ 5 & 4 & 3 \end{bmatrix}$ and

$B = \begin{bmatrix} 3 & -1 & 4 \\ 0 & -1 & 1 \\ 2 & 4 & -2 \end{bmatrix}$. **5**

**c** Find the Adjoint of the matrix $A = \begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 1 \\ 0 & 3 & 3 \end{bmatrix}$. **5**

**d** Find the charcteristic equation and eigen values for the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$. **6**

## SECTION – 2

| | | | |
|---|---|---|---|
| 3 | | | |
| | a | If the straight line is passing through the points (1, 2) and (3, 5) then find the slope of the line. | 4 |
| | b | Write the standard intercept form of the straight line and hence find the equation of the straight line whose x and y intercepts are 2 and 3 respectively. | 5 |
| | c | Write the standard slope-intercept form of a straight line. Find the equation of the straight line passing through the point (3, 5) and slope 4 units. | 5 |
| | d | Find the equation of the straight line parallel to the line passing through the points (1, 3) and (4, 6). | 6 |
| 4 | | | |
| | a | i) If a line inclined at $45^\circ$ with $x$-axis find its slope. ii) Write the x and y intercept of the line 2x+3y=10. | 2+2 |
| | b | Find the equation of the straight line whose angle of inclination is $45^0$ and passingthrough the origin. | 5 |
| | c | Find the equation of the straight line perpendicular to the line 2x+6y=3 and with the y intercept 2 units. | 5 |
| | d | Find the acute angle between the lines 7x-4y=0 and 3x-11y +5=0. | 6 |

## SECTION – 3

| | | | |
|---|---|---|---|
| 5 | a | Express $75^\circ$ in radian measure and $3\pi/2$ in degree. | 4 |
| | b | Prove that $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B$. | 5 |
| | c | Show that $\cos 2\theta = 2\cos^2\theta - 1$. | 5 |
| | d | Find the value of $\sin 120^\circ \cdot \cos 330^\circ - \sin 240^\circ \cdot \cos 390^\circ$ without using calculator. | 6 |
| 6 | a | Find the value of $\sin 15^\circ$. | 4 |

**b** Simplify $\dfrac{\cos(360^\circ - A)\tan(360^\circ + A)}{\cot(270^\circ - A)\sin(90^\circ + A)}$. **5**

**c** Prove that $\sin 3\theta = \sin 3\theta - 4\sin^3\theta$. **5**

**d** Prove that $\sin 20^\circ \cdot \sin 40^\circ \cdot \sin 80^\circ = \dfrac{\sqrt{3}}{8}$. **6**

## SECTION – 4

**7** **a** Find the derivative of $y = x^2 + e^{2x} + \cos 2x - 2\log x$ with respect to $x$. **4**

**b** Find dy/dx of $y = \dfrac{\sec x + \tan x}{\sec x - \tan x}$. **5**

**c** Find dy/dx of $y = \tan^{-1}\left(\dfrac{1+x}{1-x}\right)$. **5**

**d** If the $s = 2x^3 + 3x + 4$ repersents the displacement of the particle in motion at time x, then find the velocity of the particle at $x = 2$ secs and acceleration at $x = 3$ secs. **6**

**8** **a** Find $\dfrac{dy}{dx}$ of $y = 3x^4 + 4\log x + 2e^{3x} + \tan^{-1} x$. **4**

**b** If $y = e^{2x}\sin 3x$ then find $\dfrac{dy}{dx}$. **5**

**c** Find $\dfrac{d^2y}{dx^2}$ if $y = 3\sin x + 4\cos x$ at $x = 1$. **5**

**d** Find the equation of tangent and normal to the curve $y = x^2$ at the point (1, 1). **6**

## SECTION – 5

**9** **a** Evaluate $\int (x-1)(x+1)dx$. **4**

**b** Evaluate $\int_0^{p/2} \sin^2 x \, dx$ **5**

**c** Evaluate $\int x \sin x dx$. **5**

**d** Find the area bounded by the curve $y = 4x - x^2 - 3$, x-axis and ordinates $x = 1$ and $x = 3$. **6**

**10**

**a** Evaluate $\int_0^2 e^x dx$. **4**

**b** Evaluate $\int \frac{4\cos(\log x)}{x} dx$. **5**

**c** Evaluate $\int x e^x \, dx$. **5**

**d** Find the volume of the solid generated by revolving the curve $y = \sqrt{x^2 + 5x}$ between $x = 1$ and $x = 2$ . **6**

**********

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| | | | |
|---|---|---|---|
| **Course Code** | 20PM01T | **Semester** | II |
| **Course Title** | **Project Management Skills** | **Course Group** | PM |
| **No. of Credits** | 4 | **Type of Course** | Activity based study |
| **Course Category** | Theory with Activities | **Total Contact Hours** | 6 Hrs Per Week (2Theory +4 hrs of classroom activities) |
| | | | 78 Hrs Per Semester |
| **Prerequisites** | 10$^{th}$Level Mathematics | **Teaching Scheme** | 4 hrs per week classroom sessions dedicated to case studies & activities |
| **CIE Marks** | 50 | **SEE Marks** | 50 |

**RATIONALE**

***Project Management is a confluence of Management principles and Engineering subject area. This course enables*** the students to develop conceptualisation of Engineering Management principles and apply the same for their engineering projects, in their domains, example, Software Development project or Construction Project and so on. The course integrates three core areas of Planning, Execution and Auditing of Projects.

**1. COURSE SKILL SET**

*Student will be able to:*

1. Understand what constitutes a project, Plan for the execution of the project by breaking into manageable work units, and Prepare necessary project artefacts
2. Track and control the Project while preparing verifiable records for Project Inspections and Audits
3. Inspect and Audit projects for Milestones or other project completion criteria and other metrics, Defects and remediation, Project learning
4. Gain knowledge and develop curiosity on latest technology trends in Project management

## 2. COURSE OUT COMES

*At the end of the course, student will be able to*

| | |
|---|---|
| **CO1** | Apply the concepts of Project Management to real projects which are expressed in the form of the Project reports or Engineering drawings |
| **CO2** | Estimate Project resources needed Time, Material and Effort, and Plan for execution |
| **CO3** | Understand, analyse and assess the risks involved in a project and plan for managing them |
| **CO4** | Use Project Management Software and processes to track and control Projects |
| **CO5** | Conduct inspection of Projects and audit progress and bills |
| **CO6** | Understand the Digital Technology trends in Project management and concepts like Smart cities |

## 3. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS

| UNIT NO | UNIT TITLE | TEACHING HOURS (L-T-P) | MARKS DISTRIBUTION(THEORY) | | | |
|---|---|---|---|---|---|---|
| | | | R LEVEL | U LEVEL | A LEVEL | TOTAL |
| 1 | Introduction | 02-00-04 | 8 | 8 | 4 | 20 |
| 2 | Project Administration | 06-00-12 | 8 | 12 | 20 | 40 |
| 3 | Project Lifecycle | 04-00-08 | 8 | 12 | 20 | 40 |
| 4 | Project Planning, Scheduling and Monitoring | 06-00-12 | 8 | 12 | 20 | 40 |
| 5 | Project Control, Review and Audit | 06-00-12 | 8 | 12 | 20 | 40 |
| 6 | Digital Project Management | 02-00-04 | 8 | 8 | 4 | 20 |
| | **Total** | 26-00-52=78 | **48** | **64** | **88** | **200** |

**Legends:** R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

## 4. DETAILS OF COURSE CONTENT

*The following topics/subtopics is to be taught and assessed in order to develop Unit Skill sets for achieving CO to attain identified skill sets.*

| UNIT NO | Unit skill set (In cognitive domain) | Topics / Subtopics | Hours L-T-P |
|---|---|---|---|
| 1 Introduction | Use Basic Science, Maths skills to understand Project management and project planning, execution and control. | Introduction and definition, Features of a Project, Types of Projects, Benefits and Obstacles in Project Management, Project Management Profession, Role of Project manager, Consultants, Project and Operation, Project Management Process, Project Scope | 02-00-04 |
| 2 Project Administration | Able to develop WBS, PEP and PM processes for Project with given inputs | Project Administration, Project Team, Project Design, Work Breakdown Structure (WBS), Project Execution Plan (PEP), Systems and Procedure Plan, Project Direction, Communication and Co-ordination, Project Success<br><br>Case Study I | 06-00-12 |
| 3 Project Lifecycle | Use project administration and project lifecycle knowledge to Assess and plan for project risk | Project Life Cycle, Phases - Project Planning, Project Execution, Project Closure, Project Risks, Project Cost Risk Analysis, Time and Cost overruns<br><br>Case Study 2a | 04-00-08 |
| 4. Project Planning, Project Scheduling and Project Monitoring and Implementation | Able to develop a detailed project plan given the inputs on manpower, funds availability and time availability | Project Planning Function, Structure, Project Scheduling, Project monitoring and Project evaluation<br><br>Case Study 2b | 06-00-12 |
| 5.Project Control, Review and Audit | Use Project Management lifecycle knowledge to Control project parameters, review and audit project performance | Project Control, Problems of Project Control, Gantt Charts, Milestone Charts, Critical Path Method (CPM), Network Technique in Project Scheduling, Crashing Project Duration through Network, Project Review, Initial Review, Performance Evaluation, | 06-00-12 |

| | | | |
|---|---|---|---|
| | | Abandonment Analysis, Project Audit<br><br>Case Study 2c | |
| 6.Digital Project Management | Understand latest trends of digital technologies impacting the domain of project management and application of the same in multiple scenario | Digital Technology trends in Project management, Cloud Technology, IoT, Smart cities, Data and analytics, case studies<br><br>Case study 3 | 02-00-04 |

1. **MAPPING OF CO WITH PO**

| CO | Course Outcome | PO Mapped | UNIT Linked | CL R/U/A | Sessions in Hrs | TOTAL - Marks |
|---|---|---|---|---|---|---|
| **CO1** | Understand the concepts of Project Management in relation to real projects which are expressed in the form of the Project reports or Engineering drawings<br><br>Case Study - I | **1, 2, 5, 7** | **1, 2** | **R/U/A** | **06** | 10 |
| **CO2** | Estimate Project resources needed Time, Material and Effort, and Plan for execution<br><br>Case study 2a | **1, 2, 3, 7** | 2, 3 | **R/U/A** | **18** | **20** |
| **CO3** | Evaluate the risks involved in a project and Plan for managing them<br><br>Case Study - 2a | **1,2,3,7** | 2,3 | **R/U/A** | **12** | **20** |
| **CO4** | Use Project Management methods with Software and/or processes to track and control Projects<br><br>Case Study 2b | **1, 4, 6, 7** | 4 | **R/U/A** | 18 | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **CO5** | Conduct inspection of Projects and audit progress and bills<br><br>Case Study 2c | **1, 2, 5, 7** | 5 | **R/U/A** | 18 | 20 |
| **CO6** | Understand the Digital Technology trends in Project management, and Engineering Industries<br><br>Case Study 3 | **1, 5, 7** | 6 | **R/U/A** | 06 | **10** |
| | | | | | **78** | **100** |

| | **CO's** | **Programme Outcomes s) (PO** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| Project Management | CO1 | 3 | 3 | 0 | 0 | 2 | 0 | 1 |
| | CO2 | 3 | 3 | 3 | 0 | 0 | 0 | 1 |
| | CO3 | 3 | 0 | 0 | 3 | 0 | 3 | 1 |
| | CO4 | 3 | 0 | 0 | 3 | 0 | 3 | 1 |
| | CO5 | 3 | 2 | 0 | 0 | 2 | 0 | 1 |
| | CO6 | 3 | 0 | 0 | 0 | 2 | 0 | 2 |

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped**

## 7. INSTRUCTIONAL STRATEGY

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes

1. Explicit instruction will be provided in intervention classes or by using different differentiation strategies in the main classroom.
2. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching method and media that are employed to develop the outcomes.
3. Observing the way their more proficient peers use prior knowledge to solve current challenges and persevere in problem solving will help struggling students to improve their approach to engaging with rich contextual problems.
4. Topics be introduced always with a reallife example and then answering What, how, why and when.
5. The teacher is able to show different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
6. In a perfect world, teacher would always be able to demonstrate how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. When a concept cannot be applied in that manner, we can still share how it might be applied within mathematics.

## 8. SUGGESTED LEARNING RESOURCES:

| SlNo. | Author | Title of Books | Publication/Year |
|---|---|---|---|
| **1** | **Dr. Lalitha Balakrishnan & Dr. Gowri Ramachandran** | **Project Management** | **Himalaya Publishing, 2019** |
| **2** | Shailesh Kumar Shivakumar | Complete Guide to Digital Project Management | Apress, 2019 |
| **3** | Prasanna Chandra | Project planning, analysis, selection, implementation and review | Tata McGraw Hill |
| **4** | Gopala Krishnan | Project Management | Mcmillan India Ltd. |

## 9. COURSE ASSESSMENT AND EVALUATION CHART

| Sl.No | Assessment | Duration | Max marks | Conversion |
|---|---|---|---|---|
| **1** | CIE Assessment 1 ( Written Test -1) At the end of 3rd week | 80 minutes | 30 | Average of three written tests 30 |
| **2** | CIE Assessment 2 (Written Test -2) At the end of 7th week | 80 minutes | 30 | |
| **3** | CIE Assessment 3 (Written Test -3) At the end of 13th week | 80 minutes | 30 | |
| **4** | CIE Assessment 4 (Group Assignment -1) At the end of 5th week | 60 minutes | 20 | Average of three 20 |
| **5** | CIE Assessment 5 (Group Assignment -2 ) At the end of 9th week | 60 minutes | 20 | |
| **6** | CIE Assessment 6 (Individual Student activity/Assignment) At the end of 11th week | 60 minutes | 20 | |
| Total Continuous Internal Evaluation (CIE) Assessment | | | | **50** |
| **8** | Semester End Examination (SEE) Assessment (Written Test) | 3 Hrs | 100 | **50** |
| **Total Marks** | | | | **100** |

**Note:**

3. SEE (Semester End Examination) is conducted for 100 Marks theory course for a time duration of 3 Hrs
4. Three CIE (written test), each of 30 marks for a time duration of 80 minutes shall be conducted. Also, three CIE (MCQ or Quiz/Group Assignment/Individual student activity or assignment) each of 20 marks for the time duration of 60 minutes shall be conducted. Any fraction at any stage during evaluation will be rounded off to the next higher digit
5. Assessment of assignment and student activity is evaluated through appropriate rubrics by the respective course coordinator. The secured mark in each case is rounded off to the next higher digit.

**10 DETAILED COURSE CONTENT**

| Unit No And Name | DETAILED COURSE CONTENT | CONTACT HRS | TOTAL |
|---|---|---|---|
| 1. Introduction | 1.1 Introduction | 3 | 6 |
| | 1.2 Meaning of Project | | |
| | 1.3 Definition and No Change Mode | | |
| | 1.4 Features of a Project | | |
| | 1.5 Types of Projects | | |
| | 1.6 Benefits of Project Management | | |
| | 1.7 Obstacles in Project Management | | |
| | 1.8 Project Management A Profession | | |
| | 1.9 Project Manager and His Role | | |
| | 1.10 Project Consultants | | |
| | 1.11 What is Operation? | **3** | |
| | 1.12 Difference between Project and Operation | | |
| | 1.13 What is Process in Project Management and Process Groups? | | |
| | 1.14 What is Scope? Difference between Project Group Objectives and | | |
| | 1.15 Project Scope | | |
| 2. Project Administration | 2.1 Essentials of Project Administration | 3 | **18** |
| | 2.2 Project Team | | |
| | 2.3 Project Design | | |
| | 2.4 Work Breakdown Structure (WBS) | | |

| | | | |
|---|---|---|---|
| | 2.5 Project Execution Plan (PEP) | 6 | |
| | 2.6 Contracting Plan | | |
| | 2.7 Work Packing Plan | | |
| | 2.8 Organisation Plan | 3 | |
| | 2.9 Systems and Procedure Plan | | |
| | 2.10 Project Procedure Manual | | |
| | 2.11 Project Diary | **3** | |
| | 2.12 Project Execution System | | |
| | 2.13 Project Direction | | |
| | 2.14 Communication in a Project | **3** | |
| | 2.15 Project Co-ordination | | |
| | 2.16 Pre-requisites for Successful Project Implementation | | |
| 3. Project Lifecycle | 3.1 Introduction | 6 | 12 |
| | 3.2 Phases of Project Life Cycle | | |
| | 3.3 Project Management Life Cycle General | | |
| | 3.4 Project Planning | | |
| | 3.5 Project Execution | | |
| | 3.6 Project Closure | | |
| | 3.7 Project Risks | 3 | |
| | 3.8 Types of Risks: Illustrations | | |
| | 3.9 Risk Assessment Techniques with Illustrations | | |
| | 3.10 Project Cost Risk Analysis | **3** | |
| | 3.11 Estimating Time and Cost Overrun Risks | | |
| | 3.12 Organisation/Procedural/Systemic Reasons for Project Cost Overruns | | |
| | 3.13 Time Overruns | | |
| 4. Project Planning, Scheduling and Monitoring | 4.1 Introduction | 6 | **18** |
| | 4.2 Nature of Project Planning | | |
| | 4.3 Need for Project Planning | | |
| | 4.4 Functions of Project Planning | | |
| | 4.5 Steps in Project Planning | | |
| | 4.6 Project Planning Structure | | |
| | 4.7 Project Objectives and Policies | | |
| | 4.8 Tools of Project Planning | | |

| | | | |
|---|---|---|---|
| | 4.9 Project Scheduling | **6** | |
| | 4.10 Time Monitoring Efforts | | |
| | 4.11 Bounding Schedules | | |
| | 4.12 Scheduling to Match Availability of Manpower | | |
| | 4.13 Scheduling to Match Release of Funds | | |
| | 4.14 Problems in Scheduling Real-life Projects | | |
| | 4.15 Introduction | **3** | |
| | 4.16 Situation Analysis and Problem Definition | | |
| | 4.17 Setting Goals and Objectives | | |
| | 4.18 Generating Structures and Strategies | | |
| | 4.19 Implementation | | |
| | 4.20 What is Project Evaluation? | **3** | |
| | 4.21 Why is Project Evaluation Important? | | |
| | 4.22 What are the Challenges in Monitoring and Evaluation? | | |
| 5. Project Control, Review and Audit | 5.1 Introduction | 6 | **18** |
| | 5.2 Projected Control Purposes | | |
| | 5.3 Problems of Project Control | | |
| | 5.4 Gantt Charts | | |
| | 5.5 Milestone Charts | | |
| | 5.6 Critical Path Method (CPM) | 6 | |
| | 5.7 Construction of a Network | | |
| | 5.8 Network Technique in Project Scheduling | | |
| | 5.9 Crashing Project Duration through Network | | |
| | 5.10 Project Review | 3 | |
| | 5.11 Initial Review | | |
| | 5.12 Post Audit | | |
| | 5.13 Performance Evaluation | | |
| | 5.14 Abandonment Analysis | | |
| | 5.15 Objectives of Project Audit | **3** | |
| | 5.16 Functions of Project Auditor | | |

| | | | |
|---|---|---|---|
| | 5.17 Project Audit Programme | | |
| | 5.18 Difficulties in Establishing Audit Purpose and Scope | | |
| 6. Digital Project Management | 6.1 Digital Technology trends in Project management | **1** | 6 |
| | 6.2 Cloud Technology, IoT, AR and VR applications in Project management, Smart Cities | **1** | |
| | 6.3 Data Science and Analytics in Project Management | **1** | |
| | 6.4 Case Studies | 3 | |

**Case Studies:**

**Please note:** The Tutors can either use the following Case studies and activities or Design on their own, with the overall Learning Outcomes being met.

**Case Study I: Residential House – Project Execution Plan**

1. Dr. Sunil Kulkarni wants to build a house on his 9000 square feet (90x100) vacant plot in Bengaluru. His requirements were given below.

   i) He lives with his wife, parents and two college going children.
   ii) He likes open space around his house and likes to do gardening during free time
   iii) His wife teaches Yoga and about 30 middle aged and old people attend the daily sessions.
   iv) He has a budget limitation of INR 230,00,000 for this project and wants to present to his wife on their 20$^{th}$ wedding anniversary which is 18 months away.
   v) His parents can not climb stairs and hence prefer a ground floor room
   vi) All the rooms should have attached bathrooms

How-ever the Civil contractor who took the work, overshot the time and money available and hence Dr Sunil was unhappy with the Architect firm who recommended the Contractor.

Task:

- Split the class into groups of three
- Ask them to prepare 2D drawings with Plan, Elevation, Sections and perspectives.
- Prepare the detailed WBS, a Project execution plan and Project communication plan for contractors
- Estimate the quantities
- Discuss on the possible reasons for delay and methods with which performance to both time and budget could have been achieved
- Present it in a seminar, with each group getting 5-10 minutes to present their idea.

**Case Study 2a:**

The Columbus Hospital proposed in Hubli is a 200 bed speciality private hospital for treatment of Cancer. The hospital will come up on a 12 acre plot between Hubli-Dharwad. A leading construction company has come forward to complete the hospital works from concept to commissioning in 9 months. The promoters are willing to spend a premium to complete the hospital in 9 month time and are not particular about type of construction, ie, RCC, Steel frame etc. The key requirements are as follows:

i) 200 bed hospital of which 40 are for critical care (ICU), 40 for pre and post-Operative care
ii) 4 Operation Theatres - 2 Major (Minimum 800 SFT each) and 2 minor (minimum 400 sft each)
iii) One full-fledged Diagnostic laboratory (1500 Sft)
iv) One 24x7 pharmacy (360 Sft min)
v) Doctors rooms, Nurses enclosures, Change rooms
vi) Office with billing counters (min 2000 sft) for all administrative staff
vii) Wheel chair parking bays, Stretcher parking bays in all floors
viii) One Cafeteria with 50 person capacity
ix) One conference room with Multimedia equipment (300 sft min)
x) Parking for ambulances, 4 wheelers, two wheelers
xi) Reception and enquiry counter
xii) All amenities should be accessible for disabled persons
xiii) Incinerator, Waste storage and disposal area
xiv) Generator and fuel storage area

Discuss

i) The various alternative approaches available to complete the hospital.
ii) Look into National Building Code and BIS standards for arriving at approximate (+/- 10%) super built-up area required, amenities to be planned
iii) The various phases of the project according to Project lifecycle and durations
iv) Prepare the detailed WBS, Project Organization required and Project Dairy template
v) Prepare a Project Plan with risks involved and the risk management plan.
vi) Estimate the cost of time overrun if the project is delayed by 114 calendar days due to issues with approvals

**Case Study 2b:**

For case study 2 above, prepare an Implementation Plan using a spread sheet software.

Discuss

i) What happens if a pandemic affects the project in its 7$^{th}$ Month. How do you mitigate the possible issues in implementation?
ii) What happens if during the fourth month of projects the client decides to reduce funds for the month by 50% ?

**Case Study 2c:**

For case study 2 above, prepare a Critical Path method Chart (CPM) showing all main activities in the WBS with milestones.

Discuss

xvi) What happens if the client decides to complete the ground floor roof 15 days earlier ?

xvii) What happens if the client reduces the inflow of project funds by 50% for the month 4 ?

xviii) Write an Audit report for the project at the end of 6$^{th}$ month

**Case Study 3:**

This will be done as a student activity and has two components.

i) Research on 3D printing in any industry and prepare a three page article

ii) Study usage of Drones in different Industries and evaluate the Cost benefits of using the same for any one scenario.

# Model Question Paper

**I A Test (CIE)**

| | |
|---|---|
| **Programme:** | **Semester: II** |
| **Course:** | **Max Marks: 30** |
| **Course Code:** | **Duration: 1 Hr 20 minutes** |
| **Name of the course coordinator:** | **Test: I/II/III** |

Note: Answer one full question from each section. One full question carries 10 marks.

| Qn.No | Question | CL | CO | PO | Marks |
|---|---|---|---|---|---|
| | **Section-1** | | | | |
| 1.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 2.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| | **Section-2** | | | | |
| 3.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 4.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| | **Section-3** | | | | |
| 5.a) | | | | | |
| b) | | | | | |
| c) | | | | | |
| 6.a) | | | | | |
| b) | | | | | |
| c) | | | | | |

# Model Question Paper
# Semester End Examination

| | |
|---|---|
| **Programme:** | **Semester: II** |
| **Course:** | **Max Marks: 100** |
| **Course Code:** | **Duration: 3 Hrs** |

**Instruction to the Candidate:**
Answer one full question from each section. One full question carries 20 marks.

| Qn.No | Question | CL | CO | Marks |
|---|---|---|---|---|
| | **Section-1** | | | |
| 1.a) | | | | |
| b) | | | | |
| 2.a) | | | | |
| b) | | | | |
| | **Section-2** | | | |
| 3.a) | | | | |
| b) | | | | |
| 4.a) | | | | |
| b) | | | | |
| | **Section- 3** | | | |
| 5.a) | | | | |
| b) | | | | |
| 6.a) | | | | |
| b) | | | | |
| | **Section-4** | | | |
| 7.a) | | | | |
| b) | | | | |
| 8.a) | | | | |
| b) | | | | |
| | **Section-5** | | | |
| 9.a) | | | | |
| b) | | | | |
| 10.a) | | | | |
| b) | | | | |

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**Board of Technical Examinations, Bangalore**

| | | | |
|---|---|---|---|
| **Course Code** | 20CE21P | **Semester** | II |
| **Course Title** | **CIVIL ENGINEERING GRAPHICS** | **Course Group** | Core |
| **No. of Credits** | 4 | **Type of Course** | Lecture & Drawing Exercise |
| **Course Category** | PC | **Total Contact Hours** | 6Hrs Per Week |
| | | | 78Hrs Per Semester |
| **Prerequisites** | High School Level Mathematics | **Teaching Scheme** | (L:T:P)= 1:0:2 |
| **CIE Marks** | 60 | **SEE Marks** | 40 |

**Prerequisites**: Basic Geometry in Secondary Education and zeal to learn the course.

**Course Objectives:**

1. The course is aimed at developing Basic Drawing skills.
2. Skills in Reading and Interpretation of Engineering Drawings.
3. Skills in usage of CADD software.

On successful completion of the course, the students will be able to:

| | Course Outcome | CL | Linked PO | Teaching Hrs |
|---|---|---|---|---|
| **CO1** | Acquire Knowledge about importance of Engineering drawing and use of drawing instruments effectively and Able to draw figures to given scale and dimension the given figures as per BIS | R,U,Ap | 1,2,4 | 09 |
| **CO2** | Acquire knowledge about geometric constructions and conic section and to learn their application in civil engineering field | R,U,Ap | 1,2,4 | 06 |
| **CO3** | Discover the concept of projection and acquire visualization skills related to projections of points, Lines, planes and solids | R,U,Ap | 1,2,4 | 27 |
| **CO4** | Develop the ability to draw the isometric view from the orthographic views and Convert isometric views into orthographic views and learn concept of 3D visualization | R,U,Ap | 1,2,4 | 18 |
| **CO5** | Interpret the basic concept and usage of CADD software. Compare the utilities of alternate drafting software from open source. Setup CADD workstation and demonstrate basic commands of Computer Aided Design and Drafting Software. | R,U,Ap | 1,2,4 | 18 |
| **Total sessions** | | | | 78 |

**Legend- R: Remember U: Understand Ap: Application Ay: Analysis**

## Course Outcome and Programme outcome mapping

| Second Semester - CO & PO Mapping of Civil Engineering Graphics 20CE22D | | | | | | | |
|---|---|---|---|---|---|---|---|
| **COS** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** |
| C205.1 | 3 | 3 | - | 1 | - | - | - |
| C205.2 | 3 | 3 | - | 1 | - | - | - |
| C205.3 | 3 | 3 | - | 1 | - | - | - |
| C205.4 | 3 | 3 | - | 1 | - | - | - |
| C205.5 | 3 | 3 | - | 1 | - | - | - |
| **AVG** | **3** | **3** | **-** | **1** | **-** | **-** | **-** |

## Programme outcome Attainment Matrix

| Course | Programme Outcome | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PSO 1** | **PSO2** |
| | **Basic and Discipline specific knowledge** | **Problem analysis** | **Design/ development of solutions** | **Engineering Tools, Experimentation and Testing** | **Engineering practices for society, sustainability and environment** | **Project Management** | **Life-long learning** | | |
| **CIVIL ENGINEERING GRAPHICS** | 3 | 3 | - | 1 | - | - | - | 2 | 2 |

**Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.**

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If >40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not addressed.

**COURSE CONTENTS**

| UNITS | CONTENT | HOURS |
|---|---|---|
| 1 | ➢ **INTRODUCTION TO ENGINEERING DRAWING AND DRAWING INSTRUMENTS**<br>• Introduction to Engineering drawing,<br>• Drawing Instruments, Standard Sizes of Drawing sheets-Layout of drawing sheets, Folding of Drawing sheets as per Bureau of Indian Standards,<br>• Types of lines and their applications, Conventions used in Civil Engineering<br>➢ **DIMENSIONING PRACTICE**<br>• Introduction to Dimensioning, Elements of Dimensioning, Systems of Dimensioning, Methods of arrangements of Dimensioning<br>• Representative Fraction and Scales recommended by the Bureau of Indian Standards( Reducing scale, Enlarging scale and Full scale)<br>• Dimensioning of common features like diameters, radii, arcs and chords and simple Civil Engineering Objects. | **09** |
| **2** | ➢ **GEOMETRIC CONSTRUCTIONS**<br>• To divide a line into any number of equal parts<br>• Construction of regular Polygons using different methods<br>➢ **CONIC SECTIONS**<br>• Elements of Ellipse and Parabola<br>• Applications of Ellipse and Parabola in engineering constructions<br>• Construction of Ellipse by Concentric Circle method and Rectangle method<br>• Construction of Parabola by Rectangle method and Parallelogram method | **06** |
| **3** | ➢ **ORTHOGRAPHIC PROJECTION OF POINTS**<br>• Introduction to orthographic projection-Principal planes of projection- Four Quadrants- Concept of First angle & Third angle projection<br>• Methods-Projection of points in all the four quadrant system. Practicing exercises on projection of points in all four quadrants<br>➢ **ORTHOGRAPHIC PROJECTION OF LINES**<br>• Projection of lines - Line Parallel to both HP and VP, Line parallel to one plane and Perpendicular to other-Line parallel to one plane and Inclined to the other, Line inclined to both HP and VP.<br>• Practicing of exercises on projection of lines in different positioning | **12** |

| | | |
|---|---|---|
| **4** | ➢ **ORTHOGRAPHIC PROJECTION OF PLANES**<br>• Projection of Plane surface: Parallel to one and perpendicular to the other planes of projection, Perpendicular to one and inclined to the other planes of projection, Plane surface inclined to both planes of projection.<br>• Practicing of exercises on projection of planes in different positioning<br>➢ **ORTHOGRAPHIC PROJECTION OF SOLIDS**<br>• Introduction-Positioning of solids -Solid lying with base on HP-<br>Solids lying with base or axis inclined to HP, solid with lateral faces, lateral edge on HP, Solids lying with their base inclined to both HP and VP. (Solids like- prisms, pyramids, cone and cylinder)<br>• Practicing of exercises on projection of solids in different positioning | **15** |
| **5** | ➢ **ISOMETRIC VIEWS**<br>• Principles of isometric Views, Isometric views of regular polygons.<br>• Conversion of orthographic views into isometric View- Drawing of Isometric views of solids like prisms, pyramids, cylinder and cone.<br>• Conversion of orthographic views into isometric View -Drawing of Isometric views of combination of solids and simple civil engineering objects<br>• Conversion of isometric views into orthographic views | **18** |
| **6** | **BASIC CADD IN CIVIL ENGINEERING**<br>➢ **Introduction to CADD**<br>• General features of CADD, CADD work station, Hardware and Software requirements<br>• Advantages of using CADD, Starting CADD, Understanding CADD<br>• Editor Screen- title bar, menu bar, dashboard, standard tool bar, drawing area, UCS, command prompt area, status bar.<br>➢ **Demonstration of commands in CADD**<br>• Commands- Command Entry Options using -Command Line, Menus (File Edit, View, Insert, Format, Tools, Draw, Dimension, Modify, Window, Help) and Dialog Boxes.<br>• Understanding the use of CADD Menus and Tool Bars<br>• CADD Basic Entities- Drawing Line, Arc, Circle, Rectangle and polygons using different coordinate Systems such as Absolute Cartesian Coordinates, Relative Cartesian Coordinates, and Absolute Polar coordinates, Relative Polar Coordinates<br>• Direct distance entry and line command, picking coordinates on the screen and line command<br>• Using a wizard, using a template, starting from scratch.<br>• Selection of units, Selection of paper space, Setting up of limits<br>• Four Exercises on 2 Dimensional drawings<br>• Exercises on isometric views(Conversion of Orthographic projection to Isometric view )<br>• Exercises on isometric views(Conversion of Isometric view to Orthographic projection ) | **18** |
| **Total** | | **78 Hrs** |

**Note**: Graded exercises Plan in each unit should be as per table provided below.

**Course Delivery:**

**Unit 1 to Unit 5:** The course content will be delivered through lectures and Power point

presentations/ Videowith classroom practices (Manual drawing)

**Unit 6 :**The course content will be delivered through lectures with demonstration in CADD laboratory with lab practice using CADD software

| UNIT | DETAILED COURSE CONTENT | CO | PO | Contact Hrs |
|---|---|---|---|---|
| **UNIT-1 :INTRODUCTION TO ENGINEERING DRAWING AND DIMENSIONING PRACTICE** | | | | |
| **1** | • Introduction to Engineering drawing,<br>• Drawing Instruments, Standard Sizes of Drawing sheets<br>• Layout of drawing sheets, Folding of Drawing sheets as per Bureau of Indian Standards | CO1 | 1,2,4 | 3 |
| | • Types of lines and their applications, Conventions used in Civil Engineering<br>• Introduction to Dimensioning, Elements of Dimensioning, Systems of Dimensioning<br>• Methods of arrangements of Dimensioning | CO1 | 1,2,4 | 6 |
| | • Representative Fraction and Scales recommended by the Bureau of Indian Standards( Reducing scale, Enlarging scale and Full scale)<br>• Dimensioning of common features like diameters, radii, arcs and chords and simple Civil Engineering Objects. | CO1 | 1,2,4 | 9 |
| **UNIT-2 GEOMETRIC CONSTRUCTION AND CONIC SECTIONS** | | | | |
| **2** | • To divide a line into any number of equal parts<br>• Construction of regular Polygons using different methods<br>• Elements of Ellipse and Parabola | CO2 | 1,2,4 | 12 |
| | • Applications of Ellipse and Parabola in engineering constructions<br>• Construction of Ellipse by Concentric Circle method and Rectangle method<br>• Construction of Parabola by Rectangle method and Parallelogram method | CO2 | 1,2,4 | 15 |
| **UNIT-3 : ORTHOGRAPHIC PROJECTION,PROJECTION OF POINTS AND LINES** | | | | |
| **3** | • Introduction to orthographic projection<br>• Principal planes of projection- Four Quadrants<br>• Concept of First angle & Third angle projection method | CO3 | 1,2,4 | 18 |
| | • Projection of points in all the four quadrant system.<br>• Exercises on projection of points in all four quadrants | CO3 | 1,2,4 | 21 |
| | • Introduction to projection of line<br>• Projections of Line Parallel to both HP and VP<br>• Projection of Line parallel to one plane and Perpendicular to other | CO3 | 1,2,4 | 24 |
| | • Projections of Line parallel to one plane and Inclined to the other<br>• Projection of line inclined to both HP and VP. | CO3 | 1,2,4 | 27 |
| **UNIT-4 : ORTHOGRAPHIC PROJECTION AND PROJECTION OF PLANES AND SOLIDS** | | | | |
| **4** | • Introduction to projection of planes.<br>• Projection of plane surfaces parallel to one plane and perpendicular to the other<br>• Projection of Plane surface perpendicular to one plane and inclined to other | CO3 | 1,2,4 | 30 |

| | | | | |
|---|---|---|---|---|
| | • Projection of Plane surface inclined to both HP and VP<br>• Exercises on projection of planes | CO3 | 1,2,4 | 33 |
| | • Introduction-Positioning of solids<br>• Solid lying with base on HP<br>• Solids lying with base or axis inclined to HP. | CO3 | 1,2,4 | 36 |
| | • Positioning of solid with lateral faces, lateral edge on HP<br>• Solids lying with their base inclined to both HP and VP | CO3 | 1,2,4 | 39 |
| | • Exercises on projection of solids | CO3 | 1,2,4 | 42 |
| **UNIT-5 : ISOMETRIC VIEWS** | | | | |
| **5** | • Principles of isometric Views<br>• Isometric views of regular polygons. | CO4 | 1,2,4 | 45 |
| | • Conversion of **orthographic projection into isometric View** of solids like prisms, pyramids, cylinder, cone. | CO4 | 1,2,4 | 48 |
| | • Conversion of orthographic projection into isometric Views of combination of solids and simple civil engineering objects | CO4 | 1,2,4 | 51 |
| | • Conversion of **isometric views into orthographic projection** of combination of solids | CO4 | 1,2,4 | 54 |
| | • Conversion of isometric views into orthographic projection of simple civil engineering objects | CO4 | 1,2,4 | 57 |
| | • Exercises on isometric views | CO4 | 1,2,4 | 60 |
| **UNIT-6 : BASIC CADD IN CIVIL ENGINEERING** | | | | |
| **6** | ➢ **Introduction to CADD**<br>• General features of CADD, CADD work station, Hardware and Software requirements,<br>• Advantages of using CADD, Starting CADD<br>• Understanding CADD Editor Screen- title bar, menu bar, dashboard, standard tool bar, drawing area, UCS, command prompt area, status bar.<br>➢ **Demonstration of commands in CADD**<br>• Commands- Command Entry Options using -Command Line, Menus (File, Edit, View, Insert, Format, Tools, Draw, Dimension, Modify, Window, Help) and Dialog Boxes.<br>Understanding the use of CADD Menus and Tool Bars | CO5 | 1,2,4 | 63 |
| | • CADD Basic Entities- Drawing Line, Arc, Circle, Rectangle and polygons using different coordinate Systems such as Absolute Cartesian Coordinates, Relative Cartesian Coordinates, and Absolute Polar coordinates, Relative Polar Coordinates<br>• Direct distance entry and line command, picking coordinates on the screen and line command.<br>• Using a wizard, using a template, starting from scratch.<br>• Selection of units, Selection of paper space, Setting up of limits | CO5 | 1,2,4 | 66 |
| | • Four Exercises on 2 Dimensional (2D) drawings | CO5 | 1,2,4 | 69 |
| | • Exercises on isometric views(Conversion of Orthographic projection to Isometric view ) | C05 | 1,2,4 | 72 |
| | • Exercises on isometric views (Conversion of Orthographic projection to Isometric view ) | C05 | 1,2,4 | 75 |
| | • Exercises on isometric views (Conversion of Isometric view to orthographic projection ) | C05 | 1,2,4 | 78 |

**Course Assessment and Evaluation Chart**

| Assessment Method | Type of Assessment | | Target | Assessment methods | Max Marks | Type of record | Duration |
|---|---|---|---|---|---|---|---|
| Direct Assessment | CIE Continuous Internal Evaluation | **Portfolio Evaluation of drawing** | STUDENT | Marks awarded for each unit exercises | **20** (Average of all units marks) | Drawing sheet with log sheet ( to be folded as per BIS and filed) | Submissions to be taken after the completion of every unit |
| | | **Skill tests** | | Skill Test 1 [unit 1,2 , (part of 3) ] | **20** ( Average of 2 tests) | Manual drawing | 180 minutes |
| | | | | Skill Test 2 [ (part of unit 3) & unit 4 & unit 5 ] | | Manual drawing | 180 minutes |
| | | | | Skill Test 3 ( unit 6 ) | **20** marks | Drawing execution using CADD | 180 minutes |
| | | | | Total CIE Marks | **60 marks** | All the above | End of semester |
| | SEE | Semester End Exam | | SEE | **40 marks** | Answer sheets & CADD execution. | 180 minutes |
| | | | | Total | **100 marks** | | |
| Indirect Assessment | Student feedback | | STUDENT | Middle of the course | -NA- | Feedback forms | Middle of semester |
| | End of Course survey | | | End of course | | Questionnaire | End of the semester |

**Note:**

1. CIE is conducted for 60 marks and SEE is conducted for 100 Marks & Weightage is reduced to 40 marks
2. Three Skill tests to be conducted for 100 marks (3 Hrs) and should be reduced to 20 marks and average marks of skillTest 1 and skill test 2 shall be rounded off to the next higher digit.
3. Content of Unit 3 can be divided for Skill test 1 and skill test 2 as required
4. CIE & SEE to be conducted as per the scheme of Evaluation below

## Scheme of Evaluation for CIE : SKILL TEST 1 AND SKILL TEST 2

### MODEL QUESTION PAPER FOR SKILL TEST 1

**Programme :** **Semester: I**
**Course :** **Max Marks :100**
**Course Code :** **Duration :180 minutes**
**Name of the course coordinator:** **SKILL Test : I**

Note: Answer the following questions. One full question carries 20 marks.

| Qn.No | Question | CL | CO | PO | Marks |
|---|---|---|---|---|---|
| | **Section-1 (UNIT 1)** | | | | |
| 1.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| 2.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| | **Section-2(UNIT 2)** | | | | |
| 3.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| 4.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| | **Section-3(PART OF UNIT 3)** | | | | |
| 5.a) | | | | | 20 |
| | OR | | | | |
| c) | | | | | 20 |

### MODEL QUESTION PAPER FOR SKILL TEST 2

**Programme :** **Semester: I**
**Course :** **Max Marks :100**
**Course Code :** **Duration :180 minutes**
**Name of the course coordinator:** **SKILL Test : II**

Note: Answer one full question from each section. One full question carries 10 marks.

| Qn.No | Question | CL | CO | PO | Marks |
|---|---|---|---|---|---|
| | **Section-1 (PART OF UNIT 3)** | | | | |
| 1.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| | **Section-2(UNIT4)** | | | | |
| 2.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| 3.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |
| | **Section-3( UNIT 5)** | | | | |
| 4.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |

| | | |
|---|---|---|
| 1 | Viva | 10 marks |
| 2 | Concept of CADD work station and Demo of commands | 20 marks |
| 3 | Drawing of Isometric view ( orthographic projection to isometric view ) | 35 marks |
| 4 | Drawing of Isometric view (Isometric view to orthographic projection ) | 35 marks |
| **Total** | | **100 marks** |

| | | | | | |
|---|---|---|---|---|---|
| 5.a) | | | | | 20 |
| | OR | | | | |
| b) | | | | | 20 |

**Scheme of Evaluation for CIE – SKILL TEST 3 (Practical mode)**

**Scheme of Evaluation for SEE (Practical mode)**

| Sl. No | Questions | Max. Marks |
|---|---|---|
| **SECTION 1: Manual Drawing in given answer sheet** | | |
| A) | i. Question from Unit 1 or 2<br>Or<br>ii. Question from Unit 3 | 25 |
| B) | i. Question from Unit 4<br>Or<br>ii. Question from Unit 5 | 25 |
| **SECTION 2 : Basic CAD Drawing** | | |
| C) | i) One exercise execution on Isometric Views using CADD | 40 |
| | ii) Dimensioning of the CADD drawing executed | 10 |
| | **Total** | **100** |

**GRADED EXERCISE PLAN**

| Unit no | Name of the unit | Drawing Sheets | Title of the drawing | Minimum no of exercise |
|---|---|---|---|---|
| I | INTRODUCTION TO ENGINEERING DRAWING AND DIMENSIONING PRACTICE | 1 | Use of drawing instruments | 05 |
| | | 2 | Dimensioning | 05 |
| II | GEOMETRIC CONSTRUCTION AND CONIC SECTIONS | 2 | Geometric construction | 05 |
| | | | conic sections | 08 |
| III | ORTHOGRAPHIC PROJECTION PROJECTIONOF POINTS AND LINES | 2 | Projection of Points | 10 |
| | | 3 | Projection of Lines | 15 |
| IV | ORTHOGRAPHIC PROJECTION OF PLANES AND SOLIDS | 3 | Projection of Planes | 15 |
| | | 5 | Projection of Solids | 20 |
| V | ISOMETRIC VIEWS | 6 | Isometric Views | 30 |

| | | | | |
|---|---|---|---|---|
| VI | BASIC CADD IN CIVIL ENGINEERING | Printouts | CADD applications | 10 |

**TEXT BOOK**


1. K.R.Gopalakrishna "Fundamentals of Drawing" Subhas Publications, 2010.
2. K.R.Gopalakrishna "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.


**REFERENCES**


1. R.K. Dhawan, "A text book of Engineering Drawing", S.Chand Publishers, Delhi, 2010.
2. G.S. Phull and H.S.Sandhu, "Engineering Graphics", Wiley Publications, 2014.
3. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Private Limited, 2008.
4. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, 2005.
5. DhananjayA.Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGrawHill Publishing Company Limited, 2008.
6. BasantAgarwal and Agarwal.C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. IS 962 (1989) Code of practice for Architectural and Building Drawings
8. CAD in Civil Engineering a Laboratory Referrel- DrM.A.Jayaram, D.S.Rajendra Prasad, Sapna Book House
9. Sham Tickoo-CADD: A Problem-Solving Approach Thomson Learning EMEA, Limited George Omura- Mastering Auto CAD BPB Publication
10. Arshad N Siddique, ZahidKhab, Mukhtar Ahmed- Engineering Drawing with CADD


## E-Learning:

| | |
|---|---|
| ORIGAMI | https://www.youtube.com/watch?v=a3WFm8Yffm4 |
| UNIT 1 | https://www.youtube.com/watch?v=z4xZmBpXIzQhttps://www.youtube.com/watch?v=uojN7SOHPBw<br>https://www.youtube.com/watch?v=w2-a_EzO4-Q<br>https://www.youtube.com/results?search_query=dimensioning |
| UNIT 2 | https://www.youtube.com/watch?v=rt7qTvPYVXE<br>https://www.youtube.com/results?search_query=conic+sections+in+engineering+drawing |
| UNIT3 | https://www.youtube.com/watch?v=SB83cUaAiCMhttps://www.youtube.com/watch?v=fK4h5gM73w8&list=PLIhUrsYr8yHxEk_Jv8yOatn3Dcr6KYK3jhttps://www.youtube.com/watch?v=FtugLo9DMw8&list=PLIhUrsYr8yHz_FkG5tGWXaNbIxVcibQvV |
| UNIT4 | https://www.youtube.com/watch?v=AoNIOxnxDO0&list=PLIhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg<br>https://www.youtube.com/watch?v=YV4RZNQ2yB8&list=PLIhUrsYr8yHxARPzEFz1nXgt8j6xF_tEm |
| UNIT5 | https://www.youtube.com/watch?v=Vo9LC9d7FQA&list=PLIhUrsYr8yHxVky7bfrnbRcdXcHjTK83<br>https://www.youtube.com/watch?v=f1Hdtf_iAWk |
| | https://www.youtube.com/watch?v=It2jXzsXrVw&list=PLrOFa8sDv6jd0R3IzK-olrYadMkwsDG2g |

| | |
|---|---|
| UNIT6 | http://www.sketchup.com<br>http://www.autodesk.in/products/3ds-max/overview<br>http://www.we-r-here.com/cad/tutorials/index.htm<br>http://www.cadtutor.net/tutorials/CADD/<br>http://www.caddprimer.com/CADD_training_tutorial/CADD_training_lessons.html<br>http://www.CADDmark.com/<br>http://www.CADDtutorials.net/<br>https://www.youtube.com/watch?v=J2LiXosRKKk<br>https://www.youtube.com/watch?v=8rkkYc8mFck |

**Infrastructure required**

1. Latest Configuration Computers which can be able to run latest any Computer Aided Drafting Software. (At least One Computer per student in practical session.)-30 no
2. Any latest Authorized Computer Aided Drafting Software (30 user licenses)
3. Plotter of size A2/A3
4. LCD Projector
5. Drawing Table with chair in drawing room

**ACTIVITIES**

| | |
|---|---|
| Course co coordinator | ❖ Course coordinator should make the student understand the importance of Engineering graphics, study and deliver the course content effectively.<br>❖ Focus should be on proper selection of drawing instruments and their proper use.<br>❖ Emphasis should be given on cleanliness, dimensioning and layout of sheet.<br>❖ Course coordinator should show model of real component/part and should give live applications of those, whose drawing is to be made.<br>❖ Students should be encouraged to practice manual drawing and CADD drawings and to be given with activities to perform which can enhance their skills towards engineering objects<br>❖ At regular interval students should be assessed for the skill attainment.<br>❖ Encourage students for improvement in performance through skill tests and portfolio Evaluation<br>❖ Students should be encouraged for blended learning and flipped learning |
| Program coordinator | ❖ The department should procure AutoCADD or other engineering graphics software for practice in engineering graphics.<br>❖ Separate CADD labs and drawing room for practice on Engineering graphics should be set up<br>❖ Monitor the progress of skill learning among the students. |
| Student( suggested ) | The topic should be related to the course in order to enhance his knowledge, practical skill & and lifelong learning, communication, modern tool usage.<br>❖ Plot the different line styles used in Civil Engineering drawing.<br>❖ Collect and measure the dimensions of different paper sizes available in market.<br>❖ Develop a 3D model of simple objects like cube, prism, cylinder and cone.<br>❖ Develop a conic section<br>❖ Object of preparing models - Learn the art of **ORIGAMI** to prepare models<br>• Rectangular prism, Rectangular pyramid,<br>• Triangular prism and pyramid, Square prism and pyramid,<br>• Pentagonal prism and pyramid,<br>• Hexagonal prism and pyramid , |

| | |
|---|---|
| | • Octagonal prism and pyramid,<br>• Decagonal prism and pyramid,<br>• Cube, cone , cylinder, tetrahedron, octahedron<br>• Simple Civil Engineering objects |

**LOG SHEET FOR PORTFOLIO EVALUATION ( Model)**

**( To be maintained by the student for portfolio evaluation along with filing)**

| SI.NO | DATE OF SUBMISSION | UNIT | TITLE OF THE DRAWING | NO OF SHEETS | MARKS AWARDED | SIGNATURE OF COURSE COORDINATOR |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |

## MODEL QUESTION BANK

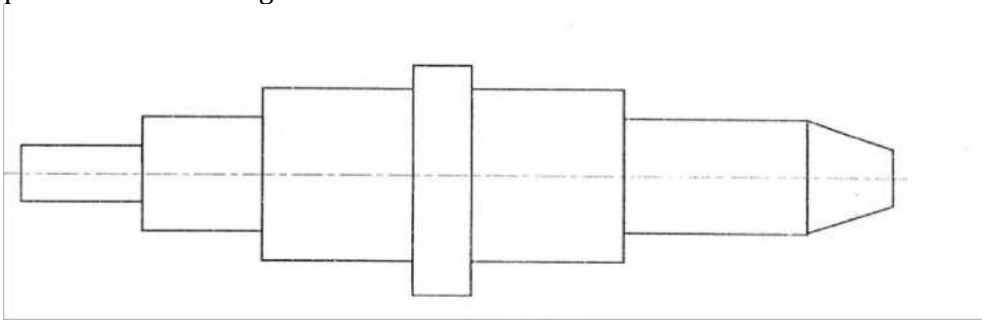
## Course: **CIVILENGINEERING GRAPHICS** Code: **20CE21P**

UNIT-I

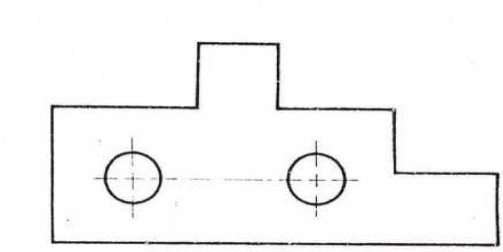
**10 Marks Questions**

1. (a) List the standard sizes of drawing sheets.
   (b)Mention the types of lines and their applications.
2. (a ) Illustrate the elements of dimensioning with the help of a sketch.
b) Illustrate the dimensioning of given common features: diameter, radius, chord, Arc and angle.
3. ( a) Mention the uses of the following drawing instruments.
   i) T-square ii) Set square iii) Bow compass iv) Clinograph v) Mini-drafter
   b) Mention the uses of the following drawing instruments.
   i) French curves ii) Protractor iii) Clips iv) Erasing Shield v) Drafting machine
   Mention the types of lines and their applications (10 marks questions)

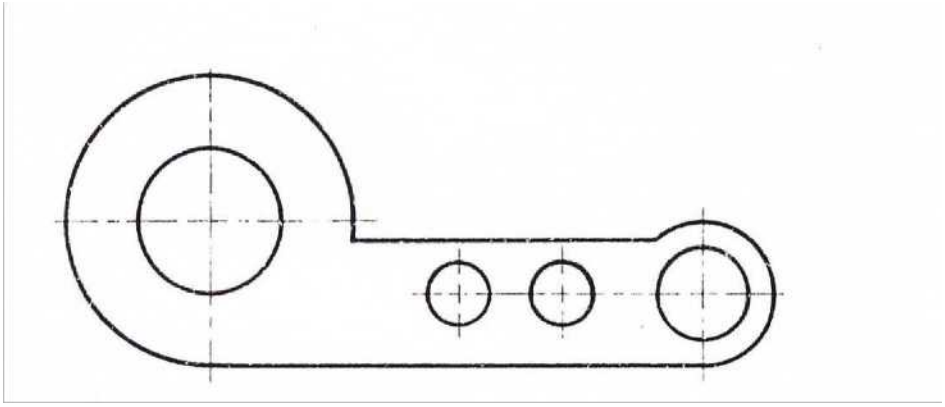
4. Copy the given sketch to 1:1 scale and dimension adopting aligned system with parallelDimensioning method.



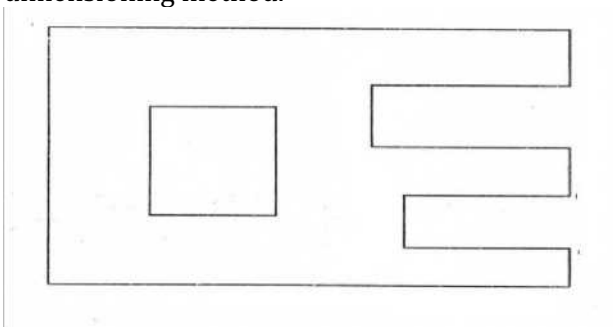
5. Copy the given sketch to 1:1 scale and dimension adopting aligned system with progressive dimensioning method.



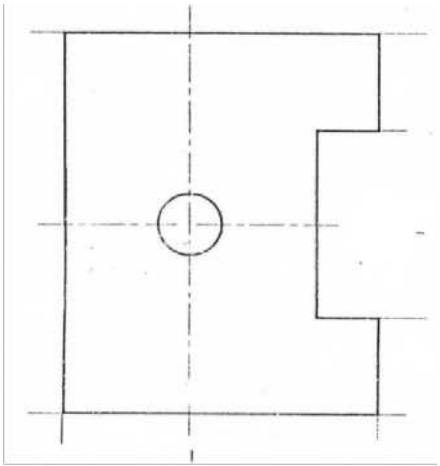
6. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with chain dimensioning method.



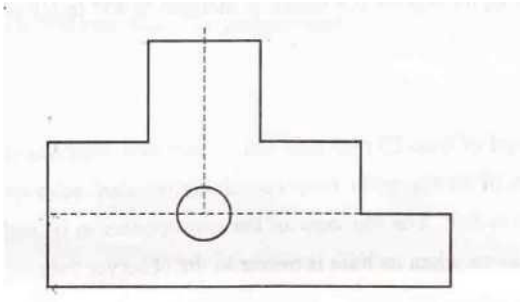
7.Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with combined dimensioning method.



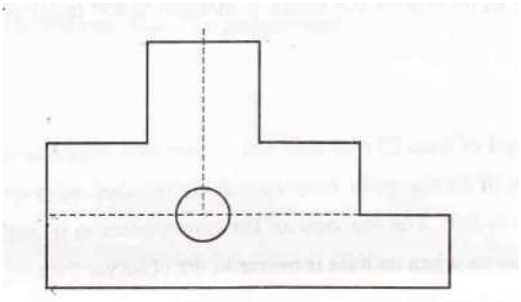
8. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with parallel dimensioning method.



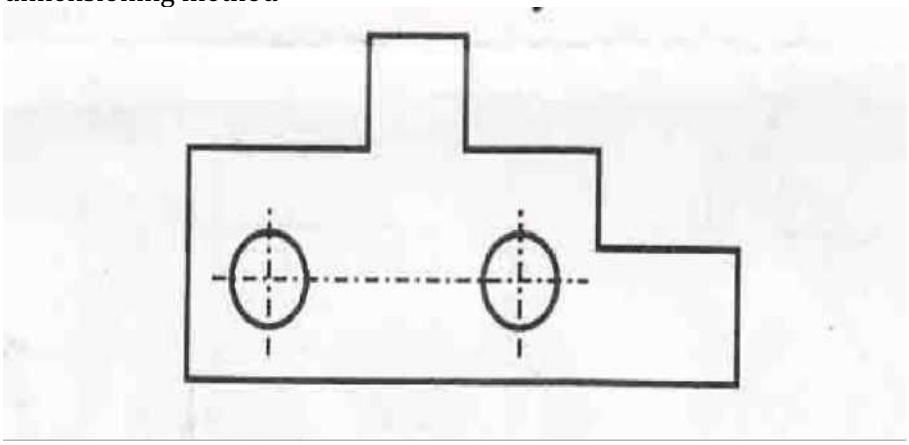
9. Copy the given sketch to 1:1 scale and dimension adopting aligned system with chain dimensioning method.



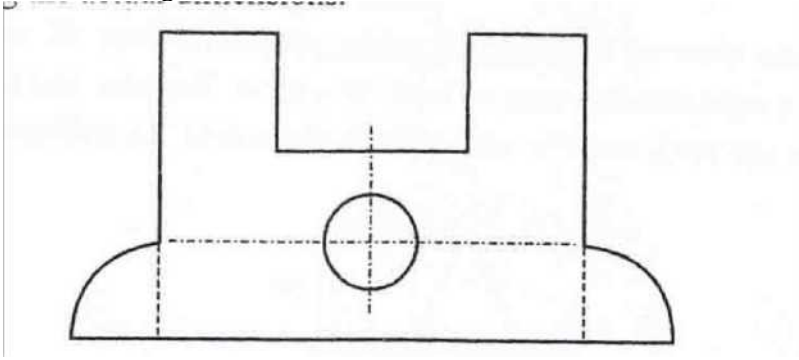
10. Copy the given sketch to 2:1 scale and dimension adopting aligned system with chain dimensioning method



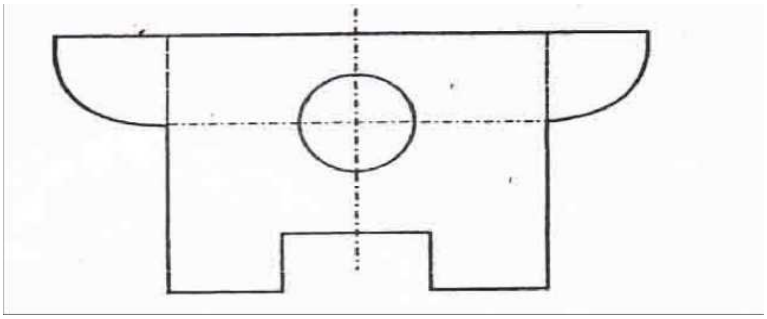
11. Copy the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



12. Draw the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



13. Draw the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



Unit II (10marks)

14. A shot thrown from the ground level reaches a maximum of 45mt and falls on the ground at a distance of 100mt from the point of projection. Trace the path of the stone in space, select scale of 1:1000.
15. An ellipse has the major and minor axes in the ratio 3:2. Draw the ellipse when the major axis is 120mm by concentric circles method.
16. Inscribe an ellipse in a rectangle of side 150mm and 120mm
17. Inscribe parabola in a rectangle of side 120mm and 80mm.
18. Inscribe parabola in a parallelogram of side 100mm and 70mm and having included angle 550
19. A shot is discharged from the ground level at an inclination of 550 to the ground which is assumed to be horizontal. The shot returns to the ground at a point 75m distance from the point of discharge. Trace the path of the shot. Take scale 1:1000.
20. A shot thrown from the ground level reaches a maximum of 45mt and falls on the ground at a distance of 100mt from the point of projection. Trace the path of the stone in space, select scale of 1:1000.

**UNIT-III** (10 marks Questions)

21. A point P is 40 mm in front of VP, 50 mm above HP and 30 mm in front of left PP. Draw the three principal views of the point.
22. A point P is 30 mm above HP, 50 mm behind VP and 45 mm in front of left PP. Draw the three principal views of the point
23. Draw the three principal views of a point P lying 40 mm behind VP, 60 mm below HP and 30 mm behind the right PP.
24. Draw the three principal views of a point P lying 60 mm below HP, 50 mm in front of VP and 45 mm in front of the left PP.
25. Draw the three principal views of a line 90 mm long placed parallel to VP and perpendicular to HP. The line is 60mm in front of VP and 50mm in front of right PP. The lower end of the line is 40mm above HP.
26. Draw the three principal views of a line 90 mm long when it is placed parallel to both HP & VP. One of the ends of the line is 60 mm above HP, 30 mm in front of VP and 40mm in front of the right

PP.

27. A line AB 95 mm long is inclined at 40° to HP and parallel to VP. The line is 90 mm in front of VP. The lower end A is 35 mm above HP, 110 mm in front of the right PP and is away from it than the higher end. Draw the three principal views of the line.
28. A line AB 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three principal views of the line.
29. Draw the projections of a line AB, 80 mm long inclined at 30° to HP and parallel to VP. The line is 40 mm in front of VP. The lower end A is 20 mm above HP.
30. The length of a line is 100 mm long and is inclined at 45° to VP and parallel to HP. The line is15 mm above HP and one end of the line is 10 mm in front of VP. Draw the projections of the line and measure top and front views.
31. A line AB 80 mm long has one of its extremities 25 mm in front of VP and 30 mm above HP. The line is inclined at 30° to HP and 45° to VP. Draw its top and front views.
32. A line AB measuring 70 mm has its end A 15 mm in front of VP and 20 mm above HP. The other end B is 60 mm in front of VP and 50 mm above HP. Draw the projections of the line with HP & VP.
33. A line PQ has its end P 15 mm above HP and mm in front of VP. The end Q is 55 mm above HP and the line is inclined at 30° to HP. The distance between the end projectors of the line when measured parallel to the line of intersection of HP &
34. VP is 50 mm. Draw the projections of the line and find its inclinations with VP.
35. The distance between the end projectors passing through the end points of a line AB is 40 mm. The end A is 20 mm above HP and 15 mm in front of VP. The line AB appears as 65 mm long in the front view. Complete the projections. Find the true length of the line and its inclinations with HP & VP.

**UNIT-IV** **(15 marks questions)**

36. An equilateral triangular lamina of side 50mm rests with one its sides on HP so that the surface of the lamina is inclined at 40° to HP. The side on which the lamina rests is inclined at 50° to VP. Draw the projections of the lamina.
37. An equilateral triangular lamina of sides 40mm is resting with one of its corners on HP, The surface of the lamina is inclined at 50° to HP and the side opposite to the corner on which the lamina rests is inclined at 40° to VP. Draw the projections of the lamina.
38. A square lamina of 40mm side rests with one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the square lamina in this position.
39. .A square lamina of 40mm sides rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to VP and Lamina appears to be inclined at 35° to HP. Draw its projections.
40. A square lamina of side 40mm rests with one of its corner on HP. The diagonal passing through this corner is inclined at 55° to HP and 30° to VP. Draw its projections.
41. A hexagonal lamina of sides 30mm rests on one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the lamina.
42. A hexagonal lamina of side 30mm is resting with one of its corner on HP so that the diagonal passing through that corner is inclined at an angle of 45° and appears to be inclined at 30° to VP. Draw the top and front views of the lamina.
43. A square lamina of ABCD of 40mm side rests on the corner C such that diagonal AC appears as at 35° to the VP in the top view. The two sides BC and CD containing the corner C make equal

inclinations with the HP. The surface of the lamina makes 40° with HP. Draw its top and front views.

44. A pentagonal plane lamina of edges 30mm is resting on HP with one of its corner touching it such that plane surface makes an angle of 50° with HP. The two of the base edges containing the corner on which the lamina rests make equal inclinations with HP. If the edge opposite to this corner makes an angle of 40° with the VP, draw the top and front views of the plane lamina in this position.
45. A hexagonal lamina of 40mm sides rests on HP on one of its sides. The side which is on HP is perpendicular to VP and the surface of the lamina is inclined to HP at 45°.The lamina is then rotated through 90° such that the side on HP is parallel to the VP, while the surface is still inclined to HP at 45°. Draw the front view and the top view of the lamina in its final position.
46. A circular lamina of 65mm diameter rests on HP such that the surface of the lamina is inclined at 40° to HP. The diameter through the point on which the lamina rests on HP appears to be inclined at 50° to the VP in the top view. Obtain its projections.
47. A hexagonal pyramid, base 30mmside and axis 60mm long has one of its triangular face containing the slant edge on which it rests are equally inclined to HP. The axis appears to be inclined at $45^0$ to VP. Draw its projections when its base is nearer to the observer than its apex.
48. Draw the projection of a pentagonal prism of base side 25mm and axis length 45mm resting on a corner such that the two base edges passing through it make equal inclination with HP and its base inclined at 60° to HP and the axis appears to be inclined at 30° to VP in the top view.
49. An equilateral triangular prism 30 mm side of base and 50mm long rests with one of its shorter edge on HP such that rectangular face containing the edge on which the prism rests is inclined at $30^0$ to HP. The edge on which the prism rests is inclined at $60^0$ to VP. Draw its projections.
50. A cone of base diameter 50mm and altitude 70mm is lying with one of its generators on HP and the axis appears to be inclined to VP at an angle of $40^0$ in the top view. Draw its top and front views.
51. A Hexagonal prism of 30 mm side of base and axis 60mm long is placed with one of its base edges on HP such that the axis is inclined at $35^0$ to HP and $45^0$ to VP. Draw its projections.
52. A Pentagonal pyramid 25mm side of base and 50mm altitude rests with one of its corners on HP such that the two base edges passing through the corner on which rests make equal inclinations with HP. The axis is inclined at $50^0$ to VP and $30^0$ to HP. Draw the top and front views of the pyramid.
53. A cone of base 60mm diameter and axis 80mm long rests on HP with its axis inclined $45^0$ to HP and $30^0$ to VP. Draw the top and front views of the cone.
54. Draw the top and front views of a right cylinder of base 50mm diameter and 70mm long when it lies on HP, such that its axis is inclined at $30^0$ to HP and axis appears to be perpendicular to VP in the top view.
55. An equilateral triangular prism of base side 25mm and 50mm long rests with one of the its shorter edges on HP so that the rectangular face containing the edge on which the prism rests

inclined at 30° to the HP. The edge on which the prism rests is inclined at 60° to the VP. Draw its projections.

56. A pentagonal prism of base edge 30mm and 60mm long has its base edge on HP. The axis of the prism is inclined at 30° to the HP and appears to be inclined at 45° to the VP. Draw the top view and the front views of the prism.

57. A hexagonal prism of 30mm base edge and axis 60mm long is placed with one of its base edges on HP so that the axis is inclined at 30° to HP and the axis appears to be inclined at 45° to VP. Draw the projections when the base of the prism is nearer to the observer.

58. A square prism of base edge 40mm and 60mm long rests with one of its corners of the base so that the longer edge passing through this corner is inclined at 40° to the HP. Draw the projections if the axis appears to be inclined at 45° to the VP in the top view.

59. A square pyramid of base edge 40mm and 60mm long has one of its shorter edges on HP. The axis of the pyramid is inclined at 30° to the HP and appears to be inclined at 45° to the VP. Draw the projections if the apex is near to the observer.

60. A cylinder of 40mm diameter and axis height 60mm is resting with its ends of the base diameter on HP. The axis of the cylinder is inclined at 30° to the HP and appears to be inclined at 45° to VP. Draw the projections.

61. A cone of base diameter 50mm and axis 80mm lies on HP with its axis inclined at 45° to HP and appears to be inclined at 30° to the VP in the top view. Draw the top and front views of the cone.

62. A right cylinder is 50mm diameter of base and height 70mm. It rests such that the axis is inclined at 30° and 45° to HP and VP respectively. Draw the top and front views.

63. A cone of base 80mm diameter and height 100mm is lying with one of its generators on HP and its axis appears to be inclined at 40° to VP in the top view. Draw its front and top views.

64. Draw the projections of a pentagonal prism 20mm side of base and axis 40mm long resting on a corner such that two base edges passing through it make equal inclinations with HP and its base is inclined at 60° to HP, and the axis appears to be inclined at 30° to VP in the top view.

65. Draw the top and front views of a rectangular pyramid of sides of base 20x25mm and height 35mm when it lies with one of its triangular faces containing the longer edge of the base on HP. This longer edge of the base containing the triangular face lying on HP is inclined at 60° to VP in the top view with the apex of the pyramid nearer to VP.

66. A pentagonal pyramid 20mm side of base of 35mm altitude rests with one of its corners on HP such that the two base edges passing through the corner on which it rests make equal inclinations with HP. The axis is inclined at 45° to VP and 30° to HP. Draw the top and front views of the pyramid.

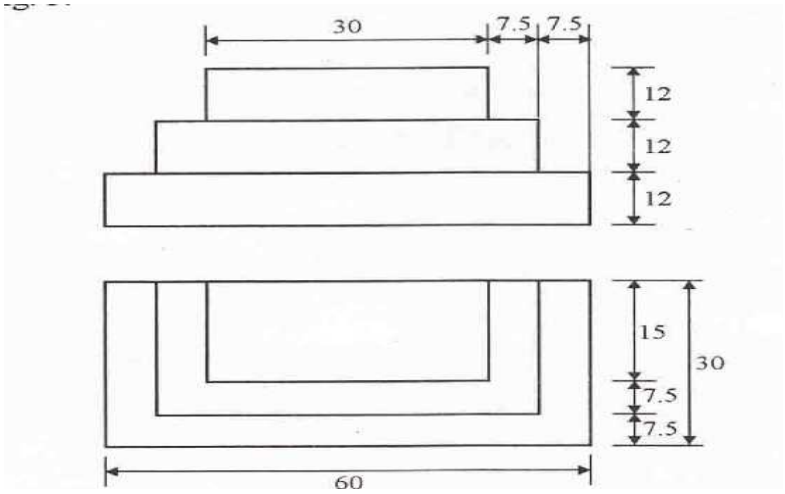
67. A hexagonal pyramid, base 30mm side and axis 60mm long has one of its slant edges on HP such that two of its triangular faces containing the slant edge on which it rests are equally inclined to HP. The top view of the axis appears to be inclined at 45° to VP. Draw its projections when its base is nearer to the observer than its apex.

68. A cone of base 60mm diameter and axis 80mm long rests on HP with its axis inclined 45° and 30° with HP and VP respectively. Draw the top and front views of the cone.

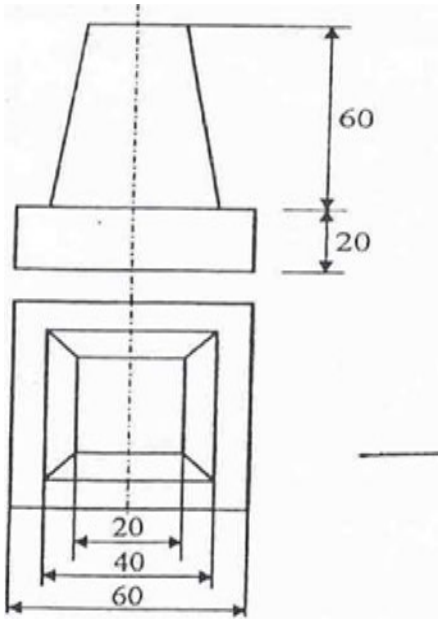
69. Draw the top and front views of a right cylinder of base 45mm diameter and 60mm long when it lies on HP, such that its axis is inclined at 30° to HP and the axis appears to be perpendicular to the VP in the top view

**UNIT V** **( 15 marks questions)**

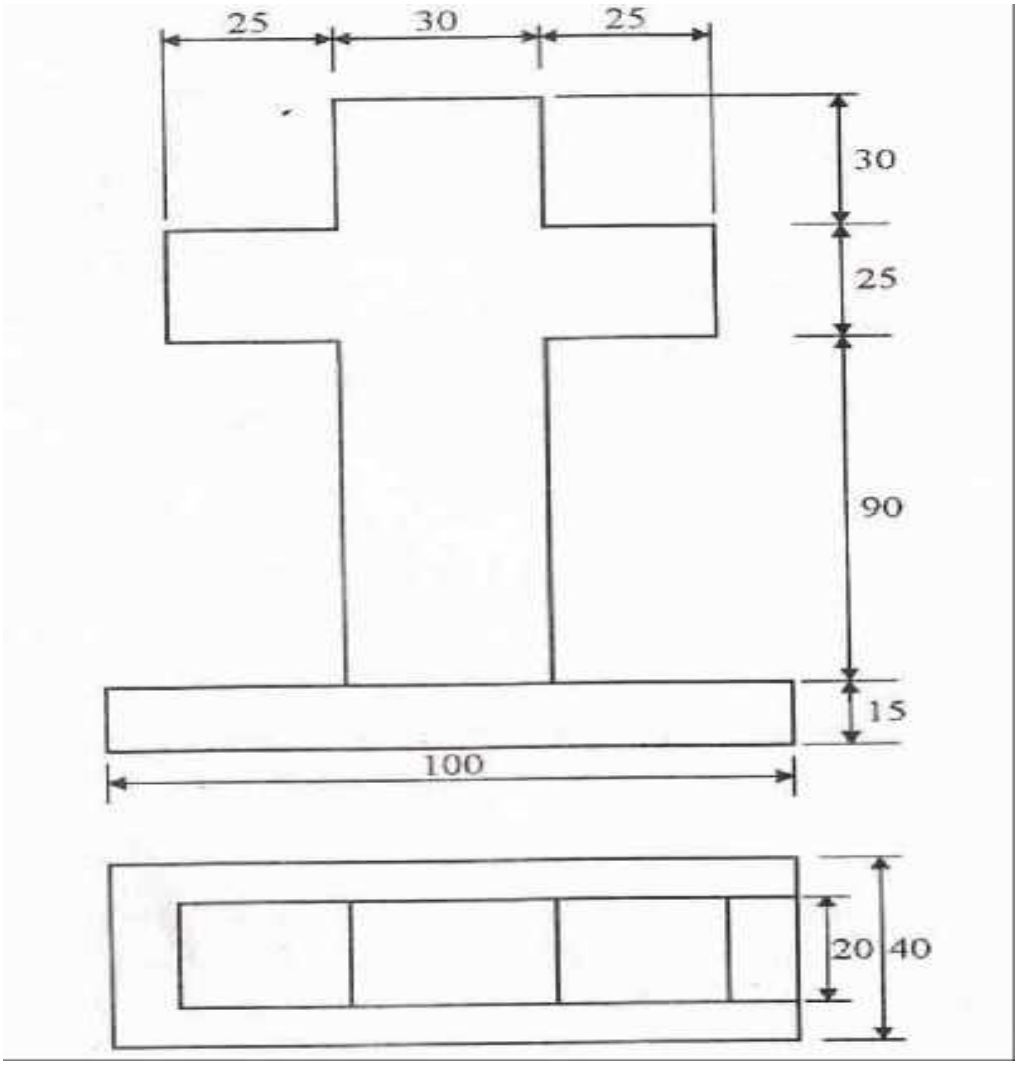
1. Draw the isometric view of the following objects whose orthographic views are given below:




2. Draw the isometric view of the following objects whose orthographic views are given below




3. Draw the isometric view of the following objects whose orthographic views are given below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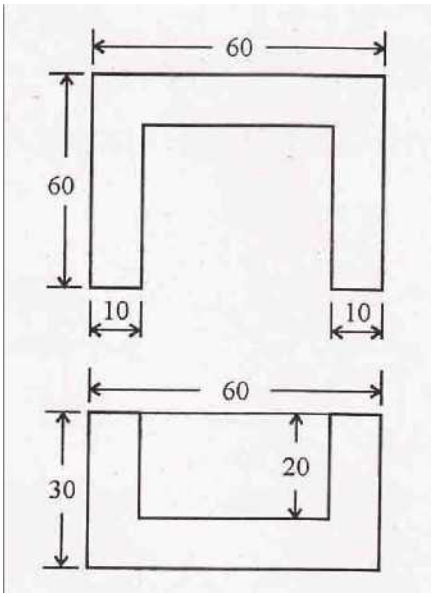
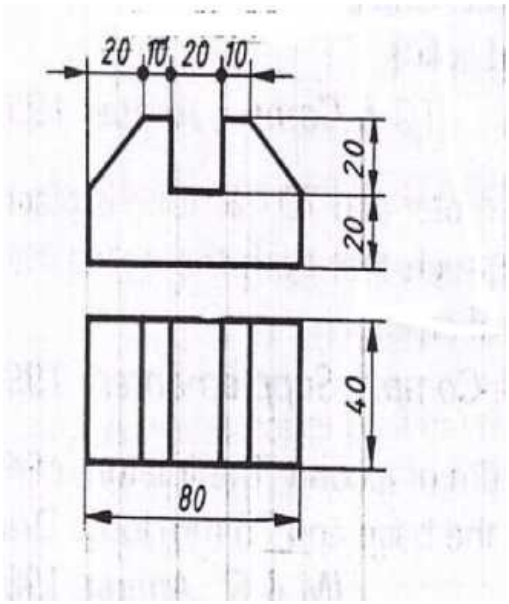
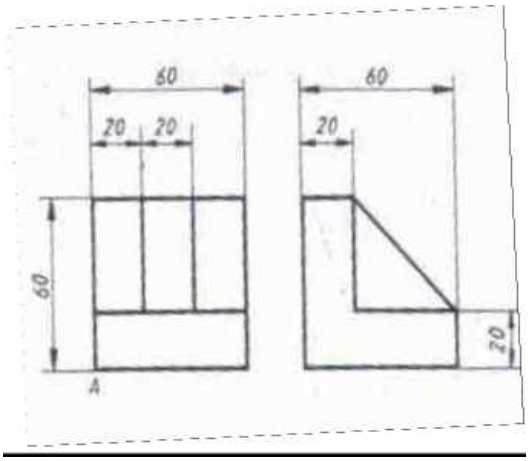
40

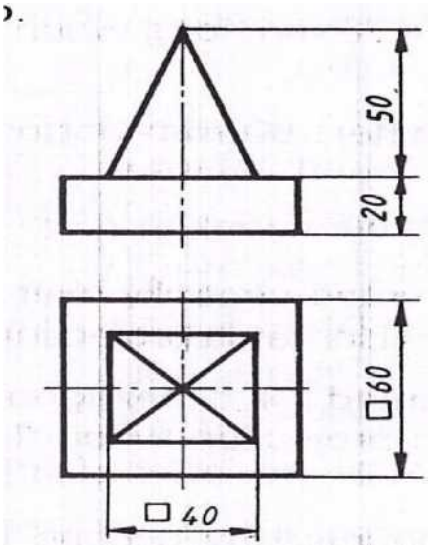
4.. Draw the isometric view of the following objects whose orthographic views are given below




5. Draw the isometric view of the following objects whose orthographic views are given below






5. A Circular column of side 40mm and height 50mm is placed centrally on a square footing of side 100mm and thickness 25mm. Draw the Isometric projections of the combination

6. A Cube of side 50mm is resting coaxially over a circular slab of diameter 100mm and thickness 30mm.Draw the isometric view of the combination of the solid. cone having diameter of the base 60mm and height 70 mm is resting co- axially on the square slab of side 100mm and thickness 40mm. Draw the isometric view of the combination of the solid.

7. A cylinder of 50mm diameter and 50mm high is placed centrally on the rectangular footing of sides 75mm and 100mm and thickness 25mm. Draw the isometric projections of the arrangement.

8. A frustum of a cone 30mm top diameter and 60mm bottom diameter and 70mm long is placed vertically on a square block of 80mm side and 30mm thick such that both the solids have common axis. Draw the isometric of the combination of the solids.

9. A cylindrical slab 100mm diameter and 40mm thick is supporting a cube of 50mm edge. On the top of the cube rests a square pyramid of altitude 55mm and side of base 30mm such that the base edges of the pyramid are parallel to the edges of the top face. The axes of the solids are in

the same straight line. Draw the isometric projection of the combination of the solids.

10. A square pyramid of base edge 50 mm and height 80 mm rests on the top of the cube of side 100 mm. Two sides of the base of the pyramid are parallel to the top edges of the cube. Draw the isometric view of the solid.

11. Three cubes of sides 60mm, 40mm and 20mm are placed centrally one above the other. Draw the isometric projections of the combination.

**Fig-1**

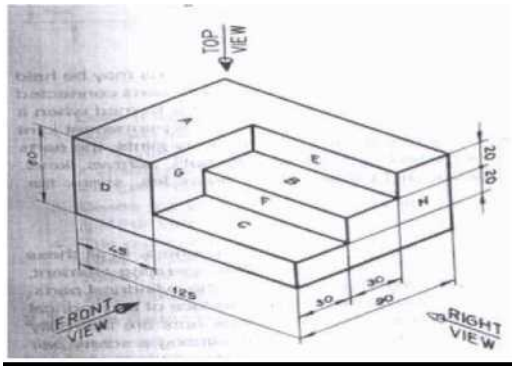



**Fig-2**

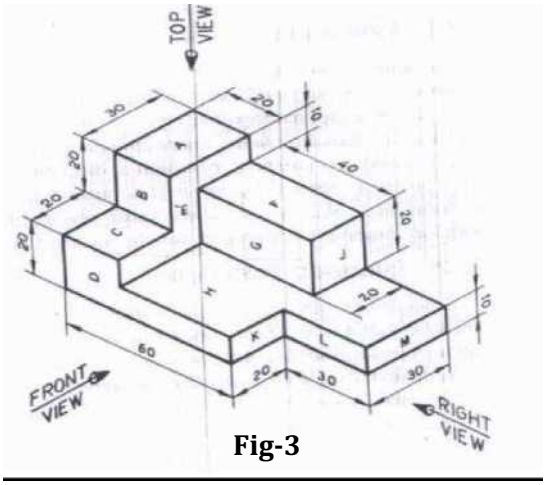



**Fig-3**

**Fig-4**

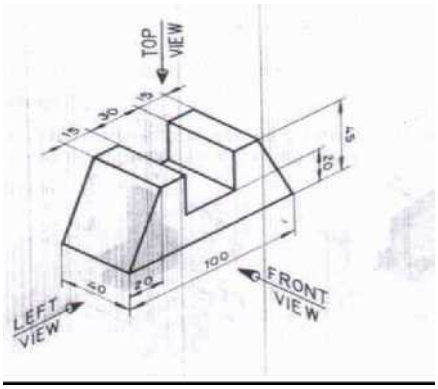



**Fig-5**

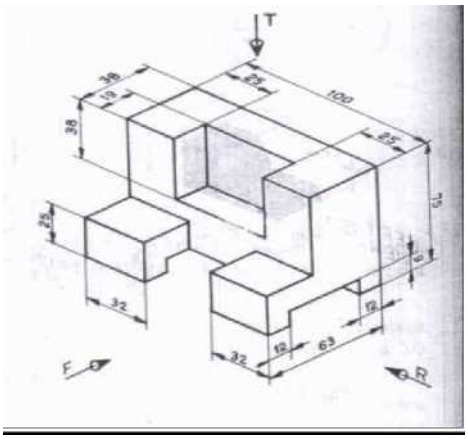



**Fig-6**

| | | | |
|---|---|---|---|
| **Course Code** | 20CE22P | **Semester** | II |
| **Course Title** | BASIC SURVEYING | **Course Group** | Core |
| **No. of Credits** | 4 | **Type of Course** | Lecture & Practice |
| **Course Category** | PC | **Total Contact Hours** | 6 Hrs Per Week<br>78 Hrs Per Semester |
| **Prerequisites** | BASICS OF MATHEMATICS & UNITS AND MEASUREMENTS | **Teaching Scheme** | (L:T:P)-1:0:2 |
| **CIE Marks** | 60 | **SEE Marks** | 40 |

## 1. COURSE SKILL SET

The aim of the course is to help student to attain the following industry identified competency through various teaching –learning experiences

5 **Perform the fundamental tasks and computations in the field of Surveying.**

## 2. INSTRUCTIONAL STRATEGY

4. Students should be exposed to different tools and equipment used in respective tasks, Operational safety and Procedure to be followed to complete the tasks. Emphasis should be given on instrument handling, selection of suitable methods.
5. Focus should be on precise measurements, calculations and their interpretation.

## 3.COURSE OUT COMES

*On successful completion of the course, the students will be able to demonstrate industry oriented CO's associated with the above mentioned competency:*

| | |
|---|---|
| **CO1** | Perform conversion of measuring units. |
| **CO2** | Identify different surveying instruments, tools and their applications. |
| **CO3** | Handle survey instruments, taking measurements, computation and interpretation. |
| **CO4** | Carryout different types of chain, tape, compass, levelling surveying tasks. |
| **CO5** | Identify errors and apply corrections suitably. |

## 4. COURSE CONTENT

The following topics/subtopics to be taught and assessed in order to develop Unit Skill sets for achieving CO to attain identified skill sets

| UNITS | Unit skill set (In cognitive domain) | Topics/Subtopics | Hours L-T-P |
|---|---|---|---|
| UNIT-1<br>INTRODUCTION | Introduction to surveying occupation<br>1)Definition, Objectives, and purposes of surveying.<br>2)Primary divisions and classifications of surveying<br>3)Principles of Surveying, Units and measurements (Linear and angular) | 1.1 Responsibility of surveyor, Future possible progression and career development provisions on completion of the course.<br>1.2 Classifications based on nature of field, purpose of survey and instruments used.<br>1.3 Conversion of units (simple problems) Errors in surveying: Types-Mistakes, systematic and accidental. | 02-00-04<br>( 02 class of 3Hr duration) |
| UNIT-2<br>CHAIN SURVEY | - Describe the procedure of finding the distance between two inter-visible and non inter-visible survey stations.<br>- Explain the method of ranging and measuring the length of the given survey line with examples.<br>- Explain the corrections in measurement of distance with the chain in a given situation.<br>- Compute area of given open field by using chain and cross staff.<br>- Select type of chaining for given situation.<br>- Applications of EDM & Rodometer in surveying. | 2.1 Chain survey Instruments: Metric Chain details with neat sketch, engineers chain, guntur chain, revenue chain.Tapes-metallic tape and steel Tape. Arrow, Tapes, Ranging rod, Ranging poles,Offset rod, Open cross staff and wooden cross staff.<br>2.2 Ranging: Direct Ranging ( I.By naked Eye II.using Line Ranger) and Indirect Ranging.<br>2.3 Chaining on flat ground and Chaining on sloping ground-by stepping method only.<br>2.4 Chain triangulation: Chain survey Station, Base line, Checkline, Tie line, Offset, Tie station.<br>Selection of survey stations. Method of Chaining, obstacles in chaining; simple problems. Types of offsets: I. Perpendicular and Oblique. II.Short and Long offsets.<br>2.5 Errors in length: Instrumental error, personal error, error due to natural cause, random error- No numerical problems.<br>2.6 Location Sketch of survey station and running measurements of building. | 05-00-10<br>( 05 class of 3 Hr duration) |

| | | | |
|---|---|---|---|
| | | 2.7 Conventional Signs Recording of measurements in a field book. | |
| UNIT-3<br><br>COMPASS SURVEY | - Carry out the traversing in a given situation by using compass and chain.<br><br>- Convert the given whole to reduced bearing and vice versa to find the included angle with examples.<br><br>- Explain construction and functions of given parts of the given type of compass.<br><br>- Determine correct bearings from the given observed bearings.<br><br>- Explain the methods used to plot a traverse in the given situation.<br><br>- Adjust the closing error of the traverse for the given data. | 3.1 Technical Terms:Bearings-True, Magnetic and Arbitrary bearing. Geographic/True,Magnetic and Arbitrary Meridians. Systems of bearing-Whole circle bearing system and Reduced Bearing system-Examples on conversion of given bearing to another (from one to another)<br><br>3.2 Components of Prismatic Compass and their Functions, Method of using Prismatic Compass- temporary adjustments and observing bearings.<br><br>3.3 Compass traversing: Open and Closed traversing. Fore Bearing and Back Bearing, Calculation of interior and exterior angles from bearings at a station (For both WCB & RB systems)<br><br>3.4 Magnetic dip and declination: simple problems on declination.<br><br>3.5 Local attraction, sources of local attraction, detection of local attraction, Methods of correction of observed bearings-Correction at station.<br><br>3.6 plotting a traverse and finding closing errors.<br><br>3.7 Errors in compass: Instrumental, Personal and natural cause. | 08-00-16<br><br>( 08 class of 3 Hr duration) |
| | - Explain the given terms related to leveling.<br><br>- Describe construction and use of the given leveling instrument. | 4.1 Terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary.<br><br>4.2 Instruments used for levelling:Types of levels: Dumpy, Auto level, Digital | |

| | | | |
|---|---|---|---|
| UNIT-4<br>LEVELLING | - Explain the given temporary adjustments of a typical dumpy level.<br><br>- Describe methods of reduction of levels by height of collimation and rise and fall method in the given situation with necessary checks.<br><br>- Select type of leveling for the given work with examples and justification.<br><br>- Compute the missing readings from the given observed readings. | level, Components of Dumpy Level and its fundamental axes,Temporary adjustments of Level. Levelling staff: Telescopic staff and target staff.<br><br>4.3 Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, intermediate sight, Change point, Height of instruments. Observing the staff reading & recording in level book.<br><br>Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.<br><br>4.5 Methods to find the R. L. in Level Book by H.I & Rise and Fall Methods with necessary checks.<br><br>4.7 Computation of missing readings.<br><br>4.8 Errors in Leveling | 11-00-22<br><br>( 11class of 3 Hr duration) |

**NOTE:**

***1.*After one hour of lecture, two hours of practice should be conducted batch wise on the respective contents**
**2. All students should wear uniforms as specified, white round hat and Shoes.**
**3.Everyone is strongly advised to take care of his/her health and safety. When working, always be alert about your surroundings.**
**4.Set up the instruments in the safest possible location. Setting up the instrument should result in saving survey time as well. Safety always overrules the time saving.**
**5.Avoid contact of instruments with electrical supply lines, especially ranging rods and leveling staff.**
**6.Do not make sudden movements that might confuse a motorist and cause evasive action that can result in injury to the motorist and/or to students.**
**7.Avoid interrupting traffic as much as possible.**

| Sl. No. | Practical Outcomes/Practical exercises | Unit No. | PO | CO | L:T:P Hrs. |
|---|---|---|---|---|---|
| 1 | Units of measurements and Conversion of units. | 1 | 1,7 | 1 | 0:0:2 |
| 2 | Effective communication and signs used in survey practice. | 1 | 1,7 | 2,3 | 0:0:2 |
| 3 | Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible. | 2 | 1,2,34 | 2,3,4 | 0:0:2 |
| 4 | Undertake reciprocal ranging and measure thedistance between two stations using EDM or RODOMETER | 2 | 1,2,34 | 2,3,4 | 0:0:2 |
| 5 | Set out perpendicular to the main survey line by different methods. | 2 | 1,2,34 | 2,3,4 | 0:0:2 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Determine area of regular polygons (Trapezium,Pentagon,Hexagon) using chain and cross staff survey | 2 | 1,2,34 | 2,3,4 | 0:0:2 |
| 7 | Undertake ranging when the chain line passes through different obstacles. | 2 | 1,2,34 | 2,3,4 | 0:0:2 |
| 8 | Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass. | 3 | 1,2,34 | 2,3,4 | 0:0:2 |
| 9 | Measure Fore Bearing and back bearing of a closed traverse of 5 sides (Regular Pentagon) and correct the bearings and included angles for the local attraction. | 3 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 10 | Measure Fore Bearing and back bearing of a closed traverse of 6 sides (Regular Hexagon) and correct the bearings and included angles for the local attraction. | 3 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 11 | Measure Fore Bearing and back bearing of a closed traverse of 3 sides (Irregular Triangle) and correct the bearings and included angles for the local attraction. | 3 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 12 | Measure Fore Bearing and back bearing of a closed traverse of 4 sides (Irregular Quadrilaterals ) and correct the bearings and included angles for the local attraction. | 3 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 13 | Measure distance between two survey stations using compass when two stations are inaccessible. | 3 | 1,2,34 | 2,3,4 | 0:0:2 |
| 14 | Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building.(Compulsory) | 3 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 15 | Plot the traverse on a drawing sheet for data collected in the Survey Project mentioned at practical No.15. | 3 | 1,2,34 | 3 | 0:0:2 |
| 16 | Perform setting and temporary adjustments of Dumpy level/Auto level | 4 | 1,2,34 | 2,3,4 | 0:0:2 |
| 17 | Take level of various points and recording it in a level book | 4 | 1,2,34 | 2,3,4 | 0:0:2 |
| 18 | Undertake simple leveling and using dumpy level/ Auto level and leveling staff. | 4 | 1,2,34 | 2,3,4 | 0:0:2 |
| 19 | Undertake differential leveling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff. | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 20 | Undertake fly leveling with double check using dumpy level/Auto level and leveling staff to establish a Temporary BM. | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 21 | Find RL of given point by taking Inverted Staff Reading | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 22 | Undertake Profile leveling and cross-sectioning for a given road length and interval. | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 23 | | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |

| | | | | | |
|---|---|---|---|---|---|
| 24 | Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval. (Compulsory). | 4 | 1,2,34 | 2,3,4,5 | 0:0:2 |
| 25 | Plot the L-section with minimum 3 cross-sections on A1 size drawing sheet for data collected in Survey Project mentioned at practical No.23 & 24 | 4 | 1,2,34 | 3 | 0:0:2 |
| 26 | | 4 | 1,2,34 | 3 | 0:0:2 |
| | | | | **Total Hours** | **0:0:52=52** |

## 5.MAPPING OF CO's WITH PO's

| CO's | Course Outcome | PO Mapped | Experiment Linked | Cognitive Level R/U/A |
|---|---|---|---|---|
| **CO1** | Perform conversion of measuring units. | PO1,PO7 | 1,2 | U,A |
| **CO2** | Identify different surveying instruments, tools and their applications. | PO1,PO2,PO3,PO4 | 3 TO 26 | A |
| **CO3** | Handle survey instruments, taking measurements, computation and interpretation. | PO1,PO2,PO3,PO4 | 3 TO 26 | A |
| **CO4** | Carryout different types of chain, tape, compass, leveling surveying tasks. | PO1,PO2,PO3,PO4 | 3 TO 26 | A |
| **CO5** | Identify errors and apply corrections suitably. | PO1,PO2,PO3 | 9,10,11,12,14,19, 20,21,22,23,24 | A |

| Course | CO's | Programme Outcomes (PO's) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **BASIC SURVEYING** | CO1 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| | CO2 | 3 | 3 | 3 | 3 | 0 | 0 | 0 |
| | CO3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 |
| | CO4 | 3 | 3 | 3 | 3 | 0 | 0 | 0 |
| | CO5 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| **Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped** | | | | | | | | |

**SUGGESTED SPECIFICATION TABLE FOR CIE QUESTION PAPER DESIGN:**

| Sl No | Unit Title | Teaching Hours | Distribution of theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R | U | A | Total Marks |
| 1 | **Introduction** | 02 | 02 | - | - | 02 |
| 2 | **Chain Survey** | 05 | - | - | 04 | 04 |
| 3 | **Compass Survey** | 08 | - | - | 06 | 06 |
| 4 | **Leveling** | 11 | - | - | 08 | 08 |
| | **TOTAL** | **26** | **02** | **00** | **18** | **20** |

## 6. SUGGESTED LEARNING RESOURCES:


1. Surveying and Levelling volume I-Kanetkar, T. P.; Kulkarni, S. V. -Pune Vidyarthi Gruh Prakashan,Pune; ISBN:978-81-858-2511-3
2. Surveying and Levelling-Basak, N. N. -McGraw Hill Education, New Delhi ISBN 93-3290-153-8
3. Surveying-Saikia, M D.; Das. B.M.; Das. M.M. -PHI Learning, New Delhi ISBN: 978-81-203-3985-9
4. Fundamentals of Surveying and Levelling-Subramanian, R. -Oxford University Press.Delhi, ISBN: 0-19-945472-8
5. Survey I -Duggal, S. K. -McGraw Hill Education, New Delhi, ISBN: 978-00-701-5137-6
6. Textbook of Surveying-Rao, P. Venugopala Akella, Vijayalakshmi -PHI Learning, New Delhi ISBN: 978-81-203-4991-9
7. Surveying I-Punmia, B.C,Jain, Ashok Kumar Jain, Arun Kumar-Laxmi Publications., New Delhi. ISBN: 8-17-008853-4
8. Surveying and Levelling, Volume 1 -Bhavikatti, S. S. -I. K. International, New Delhi ISBN: 978-81-906-9420-9
9. Textbook of Surveying-Venkatramaiah, C -Universities Press.New Delhi ISBN: 978-81-737-1021-6


**SOFTWARE/LEARNING WEBSITES**

| Sl NO | PARTICULARS/CONTENT | E-LINKS/E-CONTENT | LAUGUAGE |
|---|---|---|---|
| 1 | Classification of surveying | https://www.youtube.com/watch?v=-JgCfsooiu0 | English |
| 2 | Chain Surveying(Theory) | https://www.youtube.com/watch?v=itB45jrCPp0 | English |

| | | | |
|---|---|---|---|
| 3 | Survey Stations | https://www.youtube.com/watch?v=RXARsCjBNlU | Hindi |
| 4 | Direct Ranging | https://www.youtube.com/watch?v=x8FaSZCPbM8 | English |
| 5 | Indirect Ranging | https://www.youtube.com/watch?v=6oIyMP2iO5s | English |
| 6 | Chain Triangulation | https://www.youtube.com/watch?v=wbd-Ib2xc0Y | English |
| 7 | Chain Triangulation | https://www.youtube.com/watch?v=J7wiM6X5qt4 | English |
| 8 | Basic Construction of Regular polygon | https://www.youtube.com/watch?v=TAHczLeIUTc | Graphical |
| 9 | Obstacles occur in chain survey-obstacle to Ranging | https://www.youtube.com/watch?v=-hzoS5CQsJw | English |
| 10 | Measuring Horizontal Distance by the Direct Method: Chaining on Sloping Grounds | https://www.youtube.com/watch?v=dwNHZbZ40AQ | English |
| 11 | Errors and correction in chain surveying | https://www.youtube.com/watch?v=GOL8e3JaS7U | English |
| 12 | Types of Cross Staff | https://www.youtube.com/watch?v=w0OBpHLQv7w | English |
| 13 | Block Cross Staff | https://www.youtube.com/watch?v=Ik7wKksW11k | English |
| 14 | Perpendicular offset and oblique offset, some guidelines- Chain Surveying | https://www.youtube.com/watch?v=SLB6d4RHgMw | English/Hindi |
| 15 | Parts of Prismatic Compass | https://www.youtube.com/watch?v=-kDpvQop__k | English |
| 16 | Difference b/w surveyor & prismatic compass | https://www.youtube.com/watch?v=5DsCSxKkGws | English |
| 17 | Whole circle bearing & Quadrantal bearing | https://www.youtube.com/watch?v=iLQYLoc4ja4 | English |
| 18 | Conducting a CLOSED TRAVERSE(Irregular polygon) in surveying | https://www.youtube.com/watch?v=pGS2YX30nI8 | English |
| 19 | Open traverse | https://www.youtube.com/watch?v=6NA3Y79Pf38 | English |
| 20 | Closing error in surveying and it's correction | https://www.youtube.com/watch?v=Ww7EcE3w_x4 | English |
| 21 | Local attraction and its correction | https://www.youtube.com/watch?v=2EYQDwcizcE | English |

| | | | |
|---|---|---|---|
| 22 | Auto Level | https://www.youtube.com/watch?v=j8poe2vvD2Q | English |
| 23 | Temporary adjustment of a dumpy level | https://www.youtube.com/watch?v=V95S5drWU6M | English |
| 24 | How to read leveling staff | https://www.youtube.com/watch?v=7L3jaOvhoZk | English |
| 25 | Differential Levelling | https://www.youtube.com/watch?v=rY4XIgSueUs | English |
| 26 | Inverted Leveling | https://www.youtube.com/watch?v=xKfb6wOeoc4 | English |
| 27 | Steps involved in field data entry and cross staff survey for estimation of area | https://www.youtube.com/watch?v=RThEISUJBXg | English |
| 28 | How to Shift Dumpy Level | https://www.youtube.com/watch?v=jIxCx0oSWOY | English |
| 29 | Reciprocal leveling | https://www.youtube.com/watch?v=bru-lpQtodg | English |
| 30 | Fly leveling | https://www.youtube.com/watch?v=_SiSn_tcXZA | English |
| 31 | Profile leveling | https://www.youtube.com/watch?v=dOxlLPET77U | English |
| 32 | Profile leveling | http://www.engr.mun.ca/~sitotaw/Site/Fall2007_files/Lab4_Lecture4_Prof_leveling.pdf | PDF |
| 33 | Measuring Horizontal Distance by the Indirect Method: Using the Clinometer | https://www.youtube.com/watch?v=Dm1NtRiFgYo | English |
| 34 | Surveying & Leveling | http://ecoursesonline.iasri.res.in/course/view.php?id=523 | E-Content |
| 35 | Surveying & Leveling | http://ecoursesonline.iasri.res.in/course/view.php?id=36 | E-Content |

## 7. SUGGESTED LIST OF STUDENT ACTIVITIES

***Note: the following activities or similar activities for assessing CIE (IA) for 10 marks (Any one)***

5) Each student should conduct different activities compulsorily.

| | |
|---|---|
| **1** | Visit any construction site and make a report on different types of conventional and modern surveying equipment used. |
| **2** | Collect the information of survey instruments available in the market with specifications. |
| **3** | Perform reconnaissance survey for alignment of road. |
| **4** | Determine the RLs of the existing structures like lintels, chajja, slab, and beam. |

| | |
|---|---|
| | |

## 8.COURSE ASSESSMENT AND EVALUATION CHART

| Sl NO | Assessment | Duration | Max Marks | Conversion |
|---|---|---|---|---|
| 1. | CIE Assessment 1 ( Written Test -1-theory) - At the end of 3rd week | 60 minutes | 20 | Average of two written tests 20 marks |
| 2. | CIE Assessment 2 (Written Test -2-theory) - At the end of 13thweek | 60 minutes | 20 | |
| 3. | CIE Assessment 3 (Skill test) - At the end of 5th week | 3 Hrs | 20 | Average of three skill tests 20 marks |
| 4. | CIE Assessment 4 (Skill test) - At the end of 7th week | 3 Hrs | 20 | |
| 5. | CIE Assessment 5 ( Skill test) - At the end of 9th week | 3 Hrs | 20 | |
| 6. | CIE Assessment 6 (Student activity)- At the end of 11th week | - | 20 | 20 marks |
| 7. | Total Continuous Internal Evaluation (CIE) Assessment | | | 60 marks |
| 8. | Semester End Examination(SEE) Assessment (Practical Test) | 3 Hrs | 100 | 40 marks |
| | | | **Total Marks** | **100 marks** |

## 9. RUBRICS FOR SKILL TEST / PRACTICAL TEST (Both CIE & SEE) EVALUATION

| Sl No | Parameter to be Observed | Marks Allotted |
|---|---|---|
| 1 | Safety measures | 10 |
| 2 | Setting and operation | 25 |
| 3 | Preparation of experimental set up | 10 |
| 4 | Observations and Recording | 25 |
| 5 | Interpretation of result and Conclusion | 20 |
| 6 | Viva | 10 |
| | **Total** | **100** |

| 10.MODEL RUBRICS FOR ACTIVITY (10marks )(CAN BE MODIFIED) | | | | | | |
|---|---|---|---|---|---|---|
| **Dimension** | **Unsatisfactory** | **Developing** | **Satisfactory** | **Good** | **Exemplary** | **Student Score** |
| | 4 | 8 | 12 | 16 | **20** | |
| **Collection of data** | Does not collect any information relating to the topic | Collects very limited information; some relate to the topic | Collect much information; but very limited relate to the topic | Collects some basic information; most refer to the topic | Collects a great deal of information; all refer to the topic | 16 |
| **Fulfil team's roles & duties** | Does not perform any duties assigned to the team role | Performs very little duties but unreliable. | Performs very little duties | Performs nearly all duties | Performs all duties of assigned team roles | 12 |
| **Shares work equally** | Always relies on others to do the work | Rarely does the assigned work; often needs reminding | Usually does the assigned work; rarely needs reminding | Normally does the assigned work | Always does the assigned work without having to be reminded. | 16 |
| **Listen to other Team mates** | Is always talking; never allows anyone else to speak | Usually does most of the talking; rarely allows others to speak | Talks good; but never show interest in listening others | Listens, but sometimes talk too much | Listens and speaks a fair amount | 16 |
| | | | | | **Average / Total Marks: (16+12+16+16)/4** | **15 marks** |

## 11.MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED:

| Sl No | Equipment Name | No |
|---|---|---|
| **1.** | Metric Chain made from galvanized mild steel wires 4mm in dia, brass handles with swivel joints, brass tallies provided at every 5 m length of chain - 20 and 30m. | 05 |
| **2.** | Metallic tape-, Steel tape, Invar satisfying IS 1269 (Part 1 and Part 2 ) : 1997 specifications | 05 |
| **3.** | Pegs of length 400 mm and c/s area of 50 mm x 50 mm. | 50 |
| **4.** | Arrows 400 mm long and made up of good quality hardened and tempered steel wire of 4 mm in diameter. | 50 |
| **5.** | Metallic Ranging rods of 2 m length, circular or octagonal in cross section of 30 mm diameter, Lower shoe of 150 mm long. Painted in black, white and red stripes of 200 mm each. | 50 |
| **6.** | Line ranger, optical square confirming to IS: 7999 – 1973specifications | 50 |
| **7.** | Open cross staff consisting of 4 metal arms with vertical slits for sighting through. | 05 |
| | Surveyor compass. | 05 |
| **8.** | Prismatic compass confirming to IS 1957-1961 with stand, made in Gunmetal material having diameter of 85-110 mm and the least count of 30minutes. | 05 |
| **9.** | Dumpy level confirming to IS: 9613 – 1986 with stand and internal focusing telescope of standard make. | 05 |
| **10.** | Automatic levels confirming to IS: 9613 – 1986 with stand and internal focusing telescope of standard make. | 05 |
| **11.** | EDM and | 05 |
| **12.** | Rodometre | 05 |

**Government of Karnataka**
**Department of Collegiate and Technical Education**
**Board of Technical Examinations, Bangalore**

| | | | |
|---|---|---|---|
| **Course Code** | 20EE01P | **Semester** | I/II |
| **Course Title** | **FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING** | **Course Group** | Core |
| **No. of Credits** | 4 | **Type of Course** | Lecture & Practice |
| **Course Category** | PC | **Total Contact Hours** | 6Hrs Per Week |
| | | | 78Hrs Per Semester |
| **Prerequisites** | Basic Science | **Teaching Scheme** | (L:T:P)= 1:0:2 |
| **CIE Marks** | 60 | **SEE Marks** | 40 |

## 1. RATIONALE

Fundamentals of Electrical and Electronics Engineering is essential for all streams of diploma engineering to work in any industry as it covers basic electrical safety,troubleshooting and repairing of simple electrical systems. Basic knowledge of electrical wiring circuits, protective devices, electrical machines and basic electronics devices is required to work in any engineering field.

## 2. COURSE SKILL SET

The aim of the course is to help the student to attain the following industry identified competency through various teaching –learning experiences

1. Perform and test domestic wiring
2. Can operate electrical machine
3. Test different electronics devices

## 3. INSTRUCTIONAL STRATEGY

1. Expose to different learning tools used in respective labs, Operational safety and Procedure to be followed in the laboratory.
2. Instructor should give examples from daily routine as well as, engineering/technology applications on various concepts and principles in each topic so that students are able to understand and grasp these concepts and principles. In all contents, SI units should be followed.
3. Activity- Theory - Demonstrate/practice approach may be followed throughout the course so that learning may be skill and employability based.

## 4.COURSE OUT COMES

*On successful completion of the course, the students will be able to*

| | |
|---|---|
| **CO1** | Comply with the safety procedures |
| **CO2** | Apply the fundamentals of electricity. |
| **CO3** | Install and test electrical wiring system. |

| | |
|---|---|
| **CO4** | Identify and Operate electrical machines, Batteries and UPS. |
| **CO5** | Identify and test the different electronic devices. |

## 5. COURSE TOPICS:

| Unit No | Unit Name | Hours |
|---|---|---|
| 1 | Electrical Safety | 6 |
| 2 | Electrical Fundamentals | 15 |
| 3 | Protective Devices and Wiring circuits | 15 |
| 4 | Electric Machines and Batteries and UPS | 15 |
| 5 | Introduction to Electronic Devices and Digital Electronics | 27 |
| | **Total** | **78Hr** |

## 6. COURSE CONTENT

*The following topics/sub topics is to be taught and assessed in order to develop Unit Skill sets for achieving CO to attain identified skill sets*

| Sl No | Unit skill set (In cognitive domain) *On successful completion of the class, the students will be able to* | Topics/Sub topics | Practical | Hours L-T-P |
|---|---|---|---|---|
| | | **UNIT-1 Electrical Safety** | | |
| 1 | Comply with the Electrical safety | 1. Electrical Symbols<br>2. Electrical safety<br>• Identify Various types of safety signs and what they mean<br>• Demonstrate and practice use of PPE<br>• Demonstrate how to free a person from electrocution<br>• Administer appropriate first aid to victims, bandaging, heart attack, CPR, etc.<br>• Fire safety, causes and precautionar y activities.<br>• Use of appropriate fire extinguishers on different types of fires.<br>• Demonstrate rescue techniques applied during fire hazard, correct method to move injured people during emergency<br>• Inform relevant authority about any abnormal situation<br>• Earthing: Types | 1. Electrical symbols related to electrical engineering.<br>2. Electrical safety<br>3. Electrical earthing | 02-00-04 |

| | | | | |
|---|---|---|---|---|
| | | ➢ http://nreeder.com/Flash/symbols.htm<br>➢ http://bouteloup.pierre.free.fr/iufm/as/de/house/safety.html | | |
| **UNIT-2<br>Electrical Fundamentals** | | | | |
| 2 | 1. Identify and select the different measuring devices.<br>2. Identify different electrical supply systems<br>3. Identify open circuit, close circuit and short circuit conditions. | 1. Describe the sources of electrical energy.<br>2. Electrical current, voltage, emf, potential difference, resistance with their SI units.<br>3. Mention the meters used to measure different electrical quantities.<br>Identification Measuring devices<br>• Ammeter<br>• Voltmeter<br>• Wattmeter<br>• Ohmmeter<br>• Digital Multimeter<br>• Megger<br>• Tong tester<br>4. Explain supply systems like AC, DC.<br>➢ http://nreeder.com/Flash/units.htm | 1. Connect voltmeter and ammeter in a simple circuit. (Practicing of identification and connection of different meters) | 1:0:2 |
| 3 | Calculate basic electrical quantities | • Relationship between V, I and R. (Ohms law)<br>• Behavior of V, I in Series and Parallel DC circuits.<br>• Describe open circuit, close cir cuit and short circuit<br>• http://nreeder.com/Flash/ohmsLaw.htm | 1. Measure current, voltage and analyze effective resistance in seriescircuit<br>2. Demonstrate effects of shorts and opens in a circuit | 1:0:2 |
| 4 | Connect resistances in different combination | 1. Equation to find the effective Resistances connected in series<br>2. Equation to find effective Resistances connected in parallel<br>3. Resistances connected series and parallel combinations<br>4. Simple problems. | 1. Determine the equivalent Resistance of parallel connected resistances. | 1:0:2 |
| 5 | Calculate and measurement of different parameters of an AC quantity. | **Ac sinewave: S**inusoidal voltage, current, amplitude, time-period, cycle, frequency, phase, phase difference, and their units.<br>➢ http://nreeder.com/Flash/freqPeriod.htm<br>➢ http://nreeder.com/Flash/oscill | Generate and demonstrate the measurement of frequency, time period and phase difference of AC quantity using CRO and function generator. | 1:0:2 |

| | | | | |
|---|---|---|---|---|
| | | oscope.htm | | |
| 6 | 1. Calculate and measure electric power and energy<br>2. Identify and differentiate Single phase and Three phase supply | 1. Electrical work, power and power factor<br>• SI units<br>• Mention the meters used to measure them<br>➢ http://nreeder.com/Flash/powerLaw.htm | • Measure the voltage, current, powerusing relevant measuring instruments in a Single-phase load. | 1:0:2 |
| 7. | | 1. Electrical energy<br>• SI units<br>• Mention the meters used to measure them<br>2. Single phase and Three phase supply. | 1. Measure single phase energy using relevant measuring instruments in a Single-phase load.<br>2. Measure the voltages in Three phase supply. | |
| **UNIT-3<br>Protective Devices and Wiring circuits** | | | | |
| 8. | 1. Identify and select Protective Devices for given current and voltage rating<br>2. Identify and select the various electrician tools | • Necessity of Protective Devices<br>• Various Protective devices and their functions<br>•fuse wire,<br>•Glass cartridge fuse<br>• HRC fuse<br>• Kit-kat fuse<br>• MCB<br>• MCCB<br>• RCCB<br>• ELCB<br>• Relay<br>• Different types of electrician tools and their function.<br>• Describe various wiring tools.<br>• State procedure of care and maintenance of wiring tools. | 1. Wire up and test PVC Conduit wiring to control one lamp from two different places using suitable protective devices. | 1:0:2 |

| | | | | |
|---|---|---|---|---|
| 9 | 1. Identify and select Wiring systems for a given applications<br>2. Identify and select the cables used for different current and voltage ratings.<br>3. Draw the wiring diagram | 1. Describe different types of wiring systems.<br>• Surface conduit<br>• concealed conduit<br>• PVC casing capping<br>2. Wiring systems and their applications.<br>3. Describe the types of wires, cables used for different current and voltage ratings. | 1. Wire up and test PVC Conduit wiring to control of 2 sockets and 2 lamps. | 2:0:4 |
| 10 | Estimate and plan electrical wiring | Explain Plan and estimate the cost of electrical wiring for one 3m × 3m room consisting of 2 lamps, 1ceiling fan, 2 three pin sockets. | Prepare the estimation and plan | 1:0:2 |
| **UNIT-4<br>Electrical Machines and Batteries and UPS** | | | | |
| 11 | 1. Identify the types of transformer.<br>2. verify the transformation ratio. | **Transformer**<br>• working principle<br>• Transformation ratio<br>• Types and applications with their ratings | Connect the Single- phase transformer as Step-Up, Step-Down transformer and verify the transformation ratio. | 1:0:2 |
| 12 | 1. Start and run the induction motor.<br>2. Troubleshoot DOL/Star-delta starter and induction motor | 1. **Induction motor**<br>• Single phase and three phase Induction motor.<br>• Necessity of starters.<br>• Describe DOL AND STAR-DELTA starters.<br>2. What are different causes and remedies for a failure of starter and induction motor. | 1. Construct a suitable circuit to start and reverse the direction of three phase induction motor using DOL/ Star-delta starter.<br>2. Troubleshoot the DOL/ Star-delta starter and induction motor | 2:0:4 |
| 13 | Select and test the battery for a given application | **Battery**<br>• Types of batteries (Lead acid battery, lithium, sealed maintenance free (SMF) battery, Modular battery).<br>• Selection criteria of batteries for different applications.<br>• Ampere-Hour Capacity.<br>• Efficiency | Testing Condition of charging and discharging of a Lead-acid battery | 1:0:2 |
| 14 | Select the size of the UPS for a given application | **UPS**<br>• List the types and applications<br>• Selection criteria of UPS<br>• Sizing of UPS | Sizing of UPS | 1:0:2 |

| UNIT-5<br>Introduction to Electronic Devices and Digital Electronics | | | | |
|---|---|---|---|---|
| 15 | Identify and differentiate Conductors, insulators and semiconductors. | 1.Compare Conductors, insulators and semiconductors with examples.<br>2. Identification of types and values of resistors-color codes.<br>➢ http://nreeder.com/Flash/resistor.htm | Determine the value of resistance by color code and compare it with multimeter readings. | 1:0:2 |
| 16 | Identify and test PN junction Diode | **PN junction diode**<br>• Symbol<br>• Characteristics<br>• Diode as switch.<br>• Types of diodes and ratings<br>• Applications | Identify the terminals of a Diode and test the diode for its condition. | 1:0:2 |
| 17 | Build and test bridge rectifier circuit | **Rectifier**<br>• Need for AC to DC conversion<br>• Bridge rectifier with and without C filter,<br>• Rectifier IC. | Construct and test bridge rectifiers using semi-conductor diode and rectifier IC.<br>Compare the waveforms using CRO. | 1:0:2 |
| 18 | 1. Identify and test Transistor<br>2. Build and test transistor as an electronic switch | **Transistor (BJT)**<br>• Symbol<br>• Structure<br>• Working principle | 1. Identification of transistor terminals and test.<br>2. Construct and test the transistor as an electronic switch | 1:0:2 |
| 19. | 1. Identify and test different digital IC<br>1. | • Comparison of analog and digital signal<br>• Digital systems, examples.<br>• Binary numbers, Boolean identities and laws.<br>• Digital system building blocks: Basic logic gates, symbols and truth tables.<br>IC-Definition and advantages. | • Test a Digital IC.<br>• Identification and selection of suitable ICs for basic gates.<br>1. Verify NOT, AND, OR, NOR, EXOR and NAND gate operations (two inputs). | 2:0:4 |
| 20 | Identify and test various Sensors and actuators. | **1.Sensors**<br>• Concept<br>• Types: Temperature, Pressure, Water, Light, Sound, Smoke, proximity Sensors, Flow, humidity, voltage, vibration, IR (Principle/working, ratings/ specifications, cost, and applications)<br>**2.Actuators**<br>• Concept<br>• Types and applications.<br>• Relay as an actuator. | 2. Connect and test an IR proximity sensor to a Digital circuit.<br>• Connect and test a relay circuit using an Opto-coupler. (Photo Diode & Transistor)<br>**Refer note** | 2:0:4 |

| | | | | |
|---|---|---|---|---|
| 21 | Know the application of Microcontroller and PLC | • Microcontroller as a programmable device, and list of real-world applications.<br>• PLC and Their applications.<br>(Activity based learning) | • Identify different application microcontroller.<br>• Identify commercially available PLC and their specifications | 1:0:2 |
| | | | **TOTAL** | **26-0-52=78 Hours** |

## 7. PRATICAL SKILL EXERCISES

| Sl. No. | Practical Out Comes/Practical exercises | Unit No. | PO | CO | L: T:P Hrs. |
|---|---|---|---|---|---|
| 1 | • Identify Various types of safety signs and what they meanDemonstrate and practice use of PPE<br>• Demonstrate how to free a person from electrocution appropriate first aid to victims, bandaging, heart attack, CPR, etc.<br>• Fire safety, causes and precautionary activities.<br>• Use of appropriate fire extinguishers on different types of fires.<br>• Demonstrate rescue techniques applied during fire hazard.<br>• Inform relevant authority about any abnormal situation during fire hazard. | 1 | 1,4 | 1 | 0:0:2 |
| 2 | • Demonstrate different types of earthing/using videos.<br>• Prepare a Report on types of Earthing | 1 | 1,4 | 1 | 0:0:2 |
| 3 | Connect voltmeter and ammeter in a simple circuit. (Practicing of identification and connection of different meters) | 2 | 1,4 | 2 | 0:0:2 |
| 4 | 1.Determine the equivalent Resistance of series connected resistances.<br>2.Demonstrate effects of shorts and opens in a circuit | 2 | 1,4 | 2 | 0:0:2 |
| 5 | Determine the equivalent Resistance of parallel connected resistances. | 2 | 1,4 | 2 | 0:0:2 |
| 6 | Generate and demonstrate the measurement of frequency, time period and phase difference of AC quantity using CRO and function generator. | 2 | 1,4 | 2 | 0:0:2 |
| 7 | Measure the voltage, current, power using relevant measuring instruments in a Single-phase load. | 2 | 1,4 | 2 | 0:0:2 |
| 8. | 1.Measure single phase energy using relevant measuring instruments in a Single-phase load. | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | 2. Measure the voltages in Three phase supply. | | | | |
| 9. | Wire up and test PVC Conduit wiring to control one lamp from two different places using suitable protective devices. | 3 | 1,4 | 3 | 0:0:2 |
| 10 | 2. Wire up and test PVC Conduit wiring to control of 2 sockets and 2 lamps. | 3 | 1,4 | 3 | 0:0:2 |
| 11 | Wire up and test PVC Conduit wiring to control one lamp from two different places. | 3 | 1,4 | 3 | 0:0:2 |
| 12 | Plan and estimate the cost of electrical wiring for one 3mx3m room consisting of 2 CFL 1ceiling fan, 2 three pin sockets. | 3 | 1,4 | 3 | 0:0:2 |
| 13 | Connect the Single- phase transformer as Step-Up, Step-Down transformer and verify the transformation ratio. | 4 | 1,4 | 4 | 0:0:2 |
| 14 | Construct a suitable circuit to start and reverse the direction of three phase induction motor using DOL/star-delta starter. | 4 | 1,4 | 4 | 0:0:2 |
| 15 | Troubleshoot the DOL/Star-delta starter and induction motor | 4 | 1,4 | 4 | 0:0:2 |
| 16 | Testing Condition of charging and discharging of a Lead-acid battery. | 4 | 1,4 | 4 | 0:0:2 |
| 17 | Estimate the UPS rating for a computer lab with 50 computers/domestic. | 4 | 1,4 | 4 | 0:0:2 |
| 18 | Determine the value of resistance by color code and compare it with multimeter readings | 5 | 1,4 | 5 | 0:0:2 |
| 19 | Identify the terminals of a Diode and test the diode for its condition. | 5 | 1,4 | 5 | 0:0:2 |
| 20 | Construct and test bridge rectifiers using semiconductor diode and rectifier IC. Compare the waveforms using CRO. | 5 | 1,4 | 5 | 0:0:2 |
| 21 | Identification of transistor terminals and test. Construct and test the transistor as an electronic switch. | 5 | 1,4 | 5 | 0:0:2 |
| 22 | Test an IC. Verify the truth-table AND, OR, NOT logic gates. | | | | |
| 23 | Verify the truth-table NAND, NOR, EX-OR, EX-NOR logic gates. | 5 | 1,4 | 5 | 0:0:2 |
| 24 | Connect and test anIR proximity sensor to a Digital circuit. **NOTE:**Any sensor listed in the theory may be used for condition appropriately. | | | | |
| 25 | Connect and test a relay circuit using an Optocoupler. (Photo Diode & Transistor) | 5 | 1,4 | 5 | 0:0:2 |
| 26 | 1.Identify MCS-51 variants<br>2.Identify commercially available PLC and their specifications. | 5 | 1,4 | 5 | 0:0:2 |
| **Total** | | | | | **0:0:52 =52Hrs** |

## 8.MAPPING OF CO WITH PO

| CO | Course Outcome | PO Mapped | Experiment | Cognitive Level R/U/A | Lecture & Practical Sessions in Hrs | TOTAL |
|---|---|---|---|---|---|---|
| **CO1** | Comply with the safety procedures | PO1, PO4 | 1-2 | A | 6 | |
| **CO2** | Apply the fundamentals of electricity. | PO1, PO4 | 3-7 | A | 15 | |
| **CO3** | Install and test electrical wiring system and protective devices. | PO1, PO4 | 8-12 | A | 15 | |
| **CO4** | Identify and Operate electrical machines, Batteries and UPS. | PO1, PO4 | 13-17 | A | 15 | |
| **CO5** | Identify and test the different electronic devices. | PO1, PO4 | 18-26 | A | 27 | |

| Course | CO's | Programme Outcomes (PO's) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Fundamentals of Electrical and Electronics Engineering** | CO1 | 3 | 0 | 0 | 3 | 0 | 0 | 0 |
| | CO2 | 3 | 0 | 0 | 3 | 0 | 0 | 0 |
| | CO3 | 3 | 0 | 0 | 3 | 0 | 0 | 0 |
| | CO4 | 3 | 0 | 0 | 3 | 0 | 0 | 0 |
| **Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped** | | | | | | | | |

## 9. SUGGESTED LEARNING RESOURCES:

**Reference Books:**


1. ABC of Electrical Engineering by B. L. Theraja and A. K. Theraja, S Chand Publishers, New Delhi, 2014 Edition.
2. Basic Electrical and Electronics Engineering by S. K. Bhattacharya, Pearson Education India, 2012 Edition.
3. Electronic Devices and Circuits by I. J. Nagrath, PHI Learning Pvt. Ltd., 2007 Edition.
4. Basic Electrical Engineering byV. Mittle and ArvindMittle, McGrawHill Companies, 2005 Edition.
5. The 8051 Microcontroller & Embedded systemsusinkbnnnjbbh bb vvvvg assembly and C (2ndEdition)–M.A.Mazidi , J.C. Mazidi&R.D.McKinlay ISBN: 81-317-1026-2
6. Programmable Logic controllers, W BOLTON


**e-Resources**

1. https://www.youtube.com/watch?v=mc979OhitAg&list=PLWv9VM947MKi_7yJ0_FCfzTBXpQU-Qd3K
2. https://www.youtube.com/watch?v=CWulQ1ZSE3c
3. en.wikipedia.org/wiki/Transformer
2. www.animations.physics.unsw.edu.au//jw/AC.html
3. www.alpharubicon.com/altenergy/understandingAC.htm
4. www.electronics-tutorials

5. learn.sparkfun.com/tutorials/transistors
6. www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
7. www.technologystudent.com/elec1/transis1.htm
8. www.learningaboutelectronics.com
9. www.electrical4u.com
10.https://www.youtube.com/watch?v=zLW_7TPf310
11. https://www.youtube.com/watch?v=8PTNjw-hQIM

## 10.SUGGESTED LIST OF STUDENTS ACTIVITYS for CIE

***Note: the following activities or similar activities for assessing CIE (IA) (Any one)***

Each student should conduct different activity and no repeating should occur

| | |
|---|---|
| 1 | Using suitable meters/ instruments give the practical working circuits to measure |
| 2 | Resistance, Current, Voltage, Power and Energy in DC and AC (Single phase) Circuits. |
| 3 | List out the different types of wiring systems used in your laboratories or house with their representation. |
| 4 | Mini-Projects: Like preparing extension box, switch box and wiring models, |
| 5 | List out the different protective devices used in your laboratories or house with their ratings. |
| 6 | Applications of Electro Magnetic Induction, statically induced and dynamically induced emf, self and mutual induced emfs. |
| 7 | Prepare a report on types of starters and enclosures used for various industrial applications of AC motors. |
| 8 | Types of Cells and Battery maintenance |
| 9 | Visit nearby Battery charging shop or show room and prepare a report of the visit. |
| 10 | Prepare a report on various types of diodes used for various industrial applications. |
| 11 | Prepare a report on various types of sensors and actuators used for various industrial applications. |
| 12 | Mini-Projects: Connect and test a sensor (domain application) to a Digital circuit |

## 11. COURSE ASSESSMENT AND EVALUATION CHART

| Sl.No | Assessment | Duration | Max marks | Conversion | |
|---|---|---|---|---|---|
| 1. | CIE Assessment 1 (Written Test -1-theory)<br>- At the end of **3rd week** | 60 minutes | 20 | Average of two written tests 20 | |
| 2. | CIE Assessment 2 (Written Test -2-theory)<br>- At the end of **13th week** | 60 minutes | 20 | | |
| 3. | CIE Assessment 3 (Skill test)<br>- At the end of **5th week** | 3 Hours | 100 | 20 | Average of three skill tests 20 |
| 4 | CIE Assessment 4 (Skill test)<br>- At the end of **7th week** | 3 Hours | 100 | | |
| 5 | CIE Assessment 5 (Skill test)<br>- At the end of **9th week** | 3 Hours | 100 | | |
| 6 | CIE Assessment 6 (Student activity)<br>- At the end of **11th week** | - | 20 | 20 | |

| | | | | |
|---|---|---|---|---|
| 7. | Total Continuous Internal Evaluation (CIE) Assessment | | | 60 |
| 8. | Semester End Examination (SEE) Assessment (Practical Test) | 3 Hours | 100 | 40 |
| **Total Marks** | | | | **100** |

**Note:**

1. CIE written test is conducted for 20 marks (Two sections). Each section shall have two full questions of same CL, CO. Student shall answer one full question (10 marks) from each section.
2. CIE Skill test is conducted for 100 marks (3 Hours duration) as per scheme of evaluation and the obtained marks are scaled down to 20 marks

## 12. SCHEME OF VALUATION FOR SKILL TEST (CIE) & SEE

## (CONTINOUS INTERNAL & SEMESTER END EXAMINATION)

| Sl. No. | Particulars | Marks |
|---|---|---|
| 1. | Identification of meters/ equipment/wires/tools etc. | 10 |
| 2. | Writing Circuit/writing diagram and Procedure* | 25 |
| 3. | Conduction | 35 |
| 4. | Results | 10 |
| 5 | Viva-voce | 20 |
| **Total** | | **100** |

## 12. RUBRICS FOR ACTIVITY

| **RUBRICS FOR ACTIVITY (Example only)<br>Faculty need to develop appropriate rubrics for respective activity** | | | | | | |
|---|---|---|---|---|---|---|
| **Dimension** | **Beginning** | **Developing** | **Satisfactory** | **Good** | **Exemplary** | **Student Score** |
| | **1** | **2** | **3** | **4** | **5** | |
| **Collection of data** | Does not collect any information relating to the topic | Collects very limited information; some relate to the topic | Collect much information; but very limited relate to the topic | Collects some basic information; most refer to the topic | Collects a great deal of information; all refer to the topic | |
| **Fulfil team's roles & duties** | Does not perform any duties assigned to the team role | Performs very little duties but unreliable. | Performs very little duties | Performs nearly all duties | Performs all duties of assigned team roles | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Shares work equally** | Always relies on others to do the work | Rarely does the assigned work; often needs reminding | Usually does the assigned work; rarely needs reminding | Normally does the assigned work | Always does the assigned work without having to be reminded. | |
| **Listen to other Team mates** | Is always talking; never allows anyone else to speak | Usually does most of the talking; rarely allows others to speak | Talks good; but never show interest in listening others | Listens, but sometimes talk too much | Listens and speaks a fair amount | |
| | | | | | **Average / Total Marks:** | |

## Lab Equipment Requirement

*The following are the specification of the apparatus required for FEEE lab and number of apparatus required for the batch of 20 students.*

| Sl. No. | Name of Equipment and Specification | Quantity Required |
|---|---|---|
| 1 | Dual Channel 30 V, 2 A continuously variable DC Regulated Power Supply with Current and Overload Protection | 05 Nos. |
| 2 | +/- 15 V, 2 A, fixed DC Regulated Power Supply | 05 Nos. |
| 3 | Portable Moving Coil DC Voltmeters<br>a) 0 - 1 V<br>b) 0 - 10 V<br>c) 0 - 30 V | Each 05 Nos. |
| 4 | Portable Moving Iron AC Voltmeters<br>a) 0 - 300 V<br>b) 0 - 600 V | Each 05 Nos. |
| 5 | Portable Moving Coil DC Ammeters<br>a) 0 - 100 mA<br>b) 0 - 1 A<br>c) 0 - 2 A | Each 05 Nos. |
| 6 | Portable Moving Iron AC Ammeters<br>a) 0 - 2 A<br>b) 0 - 5 A<br>c) 0 - 10 A | Each 05 Nos. |
| 7 | Watt-meters<br>a) 150/ 300V, 2 A, UPF<br>b) 300/ 600 V, 5/ 10 A, LPF | Each 02 Nos. |
| 8 | Rheostats – 25 Ohms, 50 Ohms, 150 Ohms, 220 Ohms (all rated at 3 A) | Each 05 Nos. |
| 9 | Rheostat Loads s – 1 KW, 230 V | 02 Nos. |

| | | |
|---|---|---|
| 10 | Wire wound Resistors- 5 Ohms 2 Watts, 25 Ohms 5 Watts, 330 Ohms 2 Watts, 560 Ohms 2 Watts, etc. | Each 05 Nos. |
| 11 | Soldering Iron 60 W | 05 Nos. |
| 13 | Single Phase Energy meter 10 A, 230 V, 50 Hz, Digital type | 05 Nos. |
| 14 | Multi-meter Digital ¾" | 06 Nos. |
| 15 | Duel Trace Oscilloscope – 30 MHz | 02 Nos. |
| 16 | Three Phase Induction Motors :1 HP – 440 V 50 Hz,2 HP – 440 V 50 Hz. | Each 02 Nos. |
| 17 | Three phase DOL, Star-Delta, Auto transformer starter | Each 02 Nos. |
| 18 | UPS 1 KVA | 01 Nos. |
| 19 | Battery Lead-Acid type, 140 A-hr and Hydrometers | 02 Nos. |

| **Sl. No.** | | **Name of Equipment and Specification** | **Quantity Required** |
|---|---|---|---|
| 20 | | I C Trainer kit | 05 Nos |
| 21 | | Digital IC's 7400, 7402, 7404, 7408, 7486 etc | Each 10 Nos. |
| 22 | | Wooden Wiring board (2x3) ft | 10 |
| 23 | | Wiring accessories | |
| | 2 | a) PVC conduit - ¾" - 10 lengths<br>b) Cap and casing - ¾" - 10 lengths<br>c) Switches Single Pole- 5A, 230 V<br>d) Switches two way – 5 A, 230 V<br>e) 3 Pin Sockets 5A, 230 V<br>f) Bulb Holders – 5 A, 230 V<br>g) 3 Pin Plug 5A, 230 V<br>h) 60 Watts Lamps<br>i) 100 Watts Lamps<br>j) 15 W CFL lamps<br>k) Copper Wires of sizes<br>1.5 $mm^2$, 2.5 $mm^2$, 4 $mm^2$ – 1 coil each<br>l) Gang boxes (1+1, 2+1, 2+2)<br>m) Kit –Kat fuses 5A, 15 A<br>n) MCB 16 A & 32 A/ 230 V, Single and Double Pole<br>o) ELCB 16 A & 32 A/ 230 V, Double Pole<br>p) Neutral link- 16 A, 230 V<br>q) Screws of assorted sizes<br>r) Testers | Each 10 Nos. |

| | | | |
|---|---|---|---|
| 24 | | Electronic Components<br>a) Diodes - BY 127 and IN 4001<br>b) Zener Diodes – 6.2 V, 5.6 V, 7.8 V<br>c) Relays – solid state Sugar cube type, SPST, Coil 6V, Power circuit 230 V, 5 A.<br>d) Spring Boards<br>e) Bread Boards<br>f) Tag Boards. | Each 10 Nos. |
| 25 | | Simple PANEL BOARD/ CUBICAL consisting of bus-bars, CB/MCB/ELCB, meters, HRC fuses, magnetic contactors, cables, earthing points. | 1 No |

## ದ್ವಿತೀಯ ಸೆಮಿಸ್ಟರ್ ಕನ್ನಡ ಬಾರದ / ಕನ್ನಡೇತರ ಡಿಪ್ಲೋಮಾ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗಧಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

# ಬಳಕೆ ಕನ್ನಡ – 1

| | | | |
|---|---|---|---|
| Course Code | 20KA21T | Semester : II | Course Group – AU/KA |
| Course Title | **ಬಳಕೆ ಕನ್ನಡ – I** | Category : AU | Lecture Course |
| No. of Credits | 2 | Type of Course | CIE Marks : 50 |
| Total Contact Hours | 2 Hrs Per Week<br>26Hrs Per Semester | Teaching Scheme (L:T:P)= 2:0:0 | SEE Marks : Nil |

## Table of Contents (ಪರಿವಿಡಿ)

## ದ್ವಿತೀಯ ಸೆಮಿಸ್ಟರ್ ಕನ್ನಡ ಬಲ್ಲ ಡಿಪ್ಲೋಮಾ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗಧಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

**(ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ಪರಂಪರೆ ಕುರಿತು)**

| | | | |
|---|---|---|---|
| Course Code | **20KA21T** | Semester : II | Course Group – AU/KA |
| Course Title | **ಸಾಹಿತ್ಯ ಸಿಂಚನ** – ೧ | Category : AU | Lecture Course |
| No. of Credits | 2 | Type of Course | CIE Marks : 50 |
| Total Contact Hours | 2 Hrs per Week<br>26 Hrs per Semester | Teaching Scheme<br>(L:T:P)= 2:0:0 | SEE Marks : Nil |

# ಸಾಹಿತ್ಯ ಸಿಂಚನ – ೧ (ಕಾರ್ಯಪುಸ್ತಕ) (20KA21T)

| ಪಠ್ಯಪುಸ್ತಕದ ಪರಿವಿಡಿ | ಬೋಧನಾ ಅವಧಿ |
|---|---|
| **1. ಕರ್ನಾಟಕದ ಸಂಕ್ಷಿಪ್ತ ಇತಿಹಾಸ ಮತ್ತು ಸಾಹಿತ್ಯದ ಬೆಳವಣಿಗೆ** | **01 ಗಂಟೆ** |
| **2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಸಂಕ್ಷಿಪ್ತ ಚರಿತ್ರೆ** | **01 ಗಂಟೆ** |
| **3. ಹಳೆಗನ್ನಡ ಸಾಹಿತ್ಯ - ಪಂಪ ಪೂರ್ವ ಯುಗ** | |
| ಕನ್ನಡ ಸಾಹಿತ್ಯದ ರಚನೆಗೆ ಪ್ರಮುಖ ಪ್ರೇರಣೆಗಳು ಮತ್ತು ಪ್ರಭಾವಗಳು<br>ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಂಪರೆ ಮತ್ತು ರಾಜಾಶ್ರಯ<br>ಕವಿರಾಜಮಾರ್ಗ ಮತ್ತು ವಡ್ಡಾರಾಧನೆ | **03 ಗಂಟೆ** |
| **4. ಪಂಪ / ಚಂಪೂ ಯುಗದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಮತ್ತು ಪರಂಪರೆ** | |
| ಆದಿಕವಿ ಪಂಪ, ರನ್ನ, ಪೊನ್ನ, ಜನ್ನ. ಒಂದನೇ ನಾಗವರ್ಮ ಮತ್ತು ನಾಗಚಂದ್ರ<br>10 ಮತ್ತು 11ನೇ ಶತಮಾನದ ಸಮಕಾಲೀನ ಪ್ರಮುಖ ಕವಿಗಳು | **04 ಗಂಟೆ** |
| **5. ನಡುಗನ್ನಡ ಸಾಹಿತ್ಯ - ವಚನ ಸಾಹಿತ್ಯ / ಬಸವ ಯುಗ** | |
| ವಚನ ಸಾಹಿತ್ಯದ ಬೆಳವಣಿಗೆಗೆ ಕಾರಣಗಳು ಮತ್ತು ಅದರ ಮಹತ್ವ<br>ಪ್ರಮುಖ ವಚನಕಾರರು, ವಚನ ಸಾಹಿತ್ಯದಲ್ಲಿ ವೈಚಾರಿಕತೆ ಮತ್ತು ಕಾಯಕ ತತ್ತ್ವ | **04 ಗಂಟೆ** |
| **6. ಕುಮಾರವ್ಯಾಸ ಯುಗ ಮತ್ತು ಸಾಹಿತ್ಯದ ಇತರೆ ರೂಪಗಳು** | |
| **ರಗಳೆ –** ಹರಿಹರ,<br>**ಷಟ್ಪದಿ –** ಕುಮಾರವ್ಯಾಸ, ಲಕ್ಷ್ಮೀಶ ಮತ್ತು ರಾಘವಾಂಕ<br>**ಸಾಂಗತ್ಯ -** ರತ್ನಾಕರವರ್ಣಿ, | **04 ಗಂಟೆ** |
| **7. ದಾಸ ಸಾಹಿತ್ಯ / ಕೀರ್ತನೆಗಳು**<br>ಪುರಂದರದಾಸರು, ಕನಕದಾಸರು ಮತ್ತು ಇತರೆ ಕೀರ್ತನೆಕಾರಾರು | **02 ಗಂಟೆ** |
| **8. ಇತರೆ ಸಾಹಿತ್ಯದ ಪ್ರಕಾರಗಳು**<br>**ತ್ರಿಪದಿ** - ಸರ್ವಜ್ಞ,<br>**ಜಾನಪದ ಸಾಹಿತ್ಯ,**<br>**ತತ್ತ್ವಪದಗಳು** - ಶಿಶುನಾಳ ಶರೀಫರು | **04 ಗಂಟೆ** |
| **9. ಮಹಿಳಾ ಸಾಹಿತ್ಯ :** ಹೆಳವನಕಟ್ಟೆ ಗಿರಿಯಮ್ಮ ಮತ್ತು ಸಂಚಿಹೊನ್ನಮ್ಮ,<br>**ಆಧುನಿಕ ಪೂರ್ವ ಕನ್ನಡ ಸಾಹಿತ್ಯ :** ಕೆಂಪುನಾರಾಯಣ ಮತ್ತು ಮುದ್ದಣ | **02 ಗಂಟೆ** |
| **10. ಹಳೆಗನ್ನಡ ಮತ್ತು ನಡುಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಒಂದು ಅವಲೋಕನ** | **01 ಗಂಟೆ** |
| **ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ 26 ಗಂಟೆಗಳು** | **26 ಗಂಟೆ** |

# ಬಳಕೆ ಕನ್ನಡ -I ಮತ್ತು ಸಾಹಿತ್ಯ ಸಿಂಚನ -೦೧ ಪಠ್ಯಕ್ರಮಗಳಿಗೆ ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಮಾರ್ಗಸೂಚಿಗಳು

## (COURSE ASSESSMENTS AND EVALUATION CHART- CIE ONLY)

| Sl.No | Assessment | Type | Time frame in semester | Duration | Max marks | Conversion |
|---|---|---|---|---|---|---|
| 1. | CIE Assessment 1 | Written test-1 | - At the end of 3rd week | 80 minutes | 30 | Average of three written tests-1,2,3 for 30 marks |
| 2 | CIE Assessment 2 | Written test-2 | - At the end of 7th week | 80 minutes | 30 | |
| 3 | CIE Assessment 3 | Written test-3 | - At the end of 13th week | 80 minutes | 30 | |
| 4 | CIE Assessment 4 | MCQ/Quiz | - At the end of 5th week | 60 minutes | 20 | Average of three Assessment 4,5,6 for 20 marks |
| 5 | CIE Assessment 5 | Open book test | - At the end of 9th week | 60 minutes | 20 | |
| 6 | CIE Assessment 6 | Student activity & presentation | - At the end of 11th week | 60 minutes | 20 | |
| | Total Continuous Internal Evaluation (CIE) Assessment | | | | | **50** |
| | | | | **Total Marks** | | **50** |