ಕರ್ನಾಟಕ ಸರ್ಕಾರ

GOVERNMENT OF KARNATAKA

ಕಾಲೇಜು ಮತ್ತು ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ

DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

C-20
2020-21

Diploma in Civil Engineering

With Effect from 2020-21

C-20

Curriculum Development Cell

Department of Collegiate & Technical Education

Vision

[(To be drafted individually at institution level)]

Develop global civil engineering professionals who serve competently, collaboratively, and ethically as master to create a sustainable world and enhance the global quality of life

Mission

(To be drafted individually at institution level)

- ***M1:****To develop a specialized professional by imparting quality education and practical training in collaboration with industry, through competitive curriculum*
- ***M2:****To develop professionally skilled and ethical planners, designers, constructors, and operators of society's economic and social engine*
- ***M3:*** *To develop leadership skills in discussions and decisions shaping public environmental and infrastructure policy*
- ***M4:****To nurture innovators and integrators as entrepreneurs of ideas and technology across the public, private, and academic sectors*

Programme Educational Objectives (PEOs)

(To be drafted individually at institution level)

(After 2/3 years of graduation, the students will have the ability to)

Civil Engineering Programme is committed to transform students into competent professionals, responsible citizens. On completing the diploma programme, the students should have acquired the following characteristics.

PEO1	To apply technical knowledge in analyzing problems in the field of Civil Engineering, in the view of ensuring maximization of economic benefits to society and minimization of damage to ecology and environment.
PEO2	To enhance entrepreneurial, communication and other soft skills, which will enable them to work globally as leaders, team members and contribute to nation building for the betterment of the societywithout overexploitation of natural resources.
PEO3	To make them strongly committed to the highest levels of professional ethics and focus on ensuring quality, adherence to public policy and law, safety, reliability and environmental sustainability in all their professional activities.
PEO4	To be life-long learners with spirit of enquiry and zeal to acquire new knowledge and skills so as to remain contemporary and possess required professional skills.

PROGRAM OUTCOMES (POs)

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis: I**dentify and analyze well-defined engineering problems using codified standard methods.

3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyze individual needs and engage in updating in the context of technological changes.

CONSISTENCY MATRIX OF PEO'S WITH MISSION

	PEO statements	Adapt to Industry	Higher Learning	Team Spirit	Self-Learning	Leadership Qualities	Societal Needs	Environmental Concern
1	To apply technical knowledge in analyzing problems in the field of Civil Engineering, in the view of ensuring maximization of economic benefits to society and minimization of damage to ecology and environment.	3	3		3		3	3
2	To enhance entrepreneurial, communication and other soft skills, which will enable them to work globally as leaders, team members and contribute to nation building for the betterment of the society without overexploitation of natural resources.			3	3	3	3	
3	To make them strongly committed to the highest levels of professional ethics and focus on ensuring quality, adherence to public policy and law, safety, reliability and environmental sustainability in all their professional activities.			3	3		3	3
4	To be life-long learners with spirit of enquiry and zeal to acquire new knowledge and skills so as to remain contemporary and possess required professional skills.	3	3		3	3		

PROGRAM SPECIFIC OUTCOMES (PSOs)

Program shall specify 2-4 Program Specific Outcomes
(To be drafted individually at institution level)

PSO1	The graduates will have the ability to plan, analyses, design, execute and maintain cost effective civil engineering structures without overexploitation of natural resources.
PSO2	The graduates of civil engineering program will have the ability to take up employment, entrepreneurship, research and development for sustainable civil society.
PSO3	The graduates will be able to peruse opportunities for personal and professional growth, higher studies, demonstrate leadership skills and engage in lifelong learning by active participation in the civil engineering profession.
PSO4	The graduates will be able to demonstrate professional integrity and an appreciation of ethical, environmental, regulatory and issues related to civil engineering projects.

1.0 GENERAL PROGRAMME STRUCTURE AND CREDIT DISTRIBUTION

1. **Definition of Credit:** Credit is a kind of weightage given to the contact hours to teach the prescribed syllabus, which is in a modular form. For courses, one credit is allocated to one contact hour for theory / tutorial per week and one credit is allocated to 02 contact hours for practical.
2. **Choice-Based Credit System (CBCS):** CBCS is a flexible system of learning that permits students to learn at their own pace, choose electives from a wide range of elective courses and adopt an inter-disciplinary approach in learning and make best use of the expertise of available faculty.
3. **Range of Credits**

1 Hr. Lecture (L) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
1 Hr. Tutorial (T) per week	1 credit
4 Hrs. Theory (T) per week	4 credit
3 Hrs. Practical (P) per week [1 Hr. Tutorial +2 Hrs. Practical]	2 credit

4. **Programme**: Programme means Diploma Programme that is Diploma in Civil Engineering, which is of three years duration.

2.0 PROGRAMME STRUCTURE

1. **Course:** A Course is a component (a paper) of a Programme. All the courses need not carry same weightage. The course should define Course objectives. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ Internships / seminar or a combination of these, to meet effectively the teaching and learning needs and the credits may be assigned suitably.

2. **Course Code:** Each course shall have an alphanumeric code, which includes last two digits of year of introduction such as 20 subject code CE (CE for Civil Engineering, CH for Chemical Engineering etc.), then first two digits for example 12 (where 1 represents first semester and 2 represents the course number in incremental order) and the last alphabet represent Theory (T), Practical/Internship/Project (P), Drawing (D), Programme / Open Electives (A, B, C, E, F, G …).

3. **Programme Courses:** Each Programme will consist of Communication skills and Social Sciences (HS), Engineering Mathematics, Statistics and Analytics (BS), Engineering Sciences (ES), Professional Core (PC), Professional Electives (PE), Open Electives (OE), Employability Enhancement Courses (EEC) and Internships.

1. **Communication Skills and Social Sciences:** Communication Skills and Social Science courses are incorporated in the curriculum to meet the desired needs of communication and life skills amongst students.
2. **Engineering Mathematics, Statistics and Analytics:** Common to all Engineering Programme to develop reasoning and analytical skills amongst students.
3. **Engineering Sciences:** Engineering Science shall create awareness on different specializations of engineering studies. The goal of these courses is to create engineers of tomorrow, who possess the knowledge of all disciplines and can apply their interdisciplinary knowledge in every aspect. It could be any branch of engineering **-** Civil, Computer Science and Engineering, Electrical, Mechanical, etc.
4. **Professional Core:** Core Courses designed in the programme which are major courses of the discipline, required to attain desired outcomes and to ignite critical thinking skills amongst students.
5. **Professional Elective:** Generally a course can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline or nurtures the candidate's proficiency/skill is called Professional Elective Course.
6. **Open Electives:** An elective course chosen generally from other discipline/ subject, with an intention to seek interdisciplinary exposure is called an open elective. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents of which are similar to that of their departmental core/elective courses.
7. **Audit / Non-Core Courses:** An audit / Non-core course is one in which the student attends classes, does the necessary assignments, and takes exams. The Institute encourages students towards extra learning by auditing for additional number of courses. The results of audit courses shall not be considered for prescribed “carry over courses” limit, however students need to pass audit courses for awarding the diploma.
8. **Employability Enhancement Courses**: It contains the following courses:
    a. **Mini Project**: Mini Project is a laboratory oriented course which will provide a platform to students to enhance their practical knowledge and skills by development of small systems/application.
    b. **Seminar:** Seminar should be based on thrust areas in state of art technologies. Students should identify the topic of seminar and finalize in consultation with Guide. Students should understand the topic and compile the report in standard format and present in front of Panel of Examiners respective Programme.
    c. **Major Project:** Every student must do one major project in the Final year of their program. The minimum duration of project is 6 months. Students can do their major project in Industry or R&D Lab or in house or combination of any two.

3.0 COURSE CODE AND DEFINITION:

Course code	Definitions	Teaching Dept. Code	Name of the Teaching Department	Teaching Dept. Code	Name of the Teaching Department
L	Lecture	SC	Science	MI	Mechanical Engineering [Instruments]
T	Tutorial	CP	Commercial Practice / English	CR	Ceramic Engineering
P	Practical	ME	Mechanical Engineering	EN	Civil Environmental Engg.
HS	Humanities & Social Sciences Courses	EE	Electrical & Electronics Engg.	AN	Aeronautical Engg.
BS	Basic Science Courses	CE	Civil Engineering	MN	Mining & Mine Surveying
ES	Engineering Science Courses	EC	Electronics &Communications Engg.	MM	Modern Office Management
PC	Program Core Courses	CS	Comp Science &Engg.	LI	Library and Information Science
PE	Program Elective Courses	IS	Info Science &Engg.	FT	Apparel Design and Fabrication Technology
OE	Open Elective Courses	AT	Automobile Engg.	CH	Chemical Engineering
AU	Audit Courses	MC	Mechatronics	PO	Polymer Technology
SI	Summer Internship	MT	Metallurgical Engg.	PT	Printing Technology
PR	Project	HP	Mechanical Engineering [HPT]	TX	Textile Technology
SE	Seminar	WS	Mechanical Engineering [Welding & Sheet Metal]	EI	Electronic Instrumentation & Control Engg.
CIE	Continuous Internal Evaluation	CN	Cinematography	LT	Leather & Fashion Technology
SEE	Semester End Examination	SR	Sound Recording &Engg.	WH	Water Technology & Health Science
		PH	Civil (Public Health & Environment) Engg.	MY	Mechanical Engineering [Machine Tools]
		TD	Tool & Die Making	AR	Architecture
		ID	Interior Decoration	EG	English

4.0 INDUCTION PROGRAMME

The Essence and Details of Induction program can also be understood from the "Detailed Guide on Student Induction program', as available on AICTE Portal, although that is for Diploma students of Engineering & Technology. Suggestive schedule for induction program is given below

(Link:https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf)

Induction Program Schedule (Suggestive only)

(Induction program for students to be offered right at the start of the first year)

SL NO	DAY	TIME	ACTIVITY	VENUE
1	1	09.30-12.30	Registration, Formation of Mentor-mentee groups – Introduction of mentors with-in group.	Class rooms of respective programs
		01.30-04.30	Screening of Institute video clips of various functions held and Photos of various events, Institution Excursion	Seminar hall
2	2	09.30-12.30	Prayer- Physical activities such as yoga; Presentation cum Interactive Session with: Important Institution Functionaries like Principal, HoD's etc.	Play ground and seminar hall
		01.30-04.30	Visit to Central facilities such as Reading room,library,Sport center, computer center, hostel, NSS/NCC cell, community development cell functioning in polytechnic	Tour
		01.30-04.30	Lecturer sessions about importance of NSS/NCC/Youth red cross activities and their contribution towards national building and personality and character development	Seminar hall
4	4	09.30-12.30	Personality development talk on Human values	Seminar hall
		01.30-04.30	Interaction with Alumni students of polytechnic of different programs and interaction with few alumina and sharing their experiences	Seminar hall
5	5	09.30-12.30	Introduction to Swatch Bharath Abhiyan-Importance of Abhiyan-Clean drive in around college	Campus
		01.30-04.30	Talent hunt-Music/Antakshri/Instrument play/ Dance/Team Activity	College Auditorium
6	6	09.30-12.30	Talent hunt Activity: Essay/Debate/Best out of Waste/Pick and speak ,other	Seminar hall
		01.30-04.30	Screening of Movie related: personality development, character building, motivational ,Environmental concern, Public health, rural sanitation	College Auditorium
7	7	09.30-12.30	Exchange of views between students and faculty about their Institute/program/carrier opportunities	Seminar hall
		01.30-04.30	Games/Sports Activity	Sports ground
8	8	09.30-12.30	Talk by training and placement cell: Carrier opportunities for diploma students, placement activities in college; placement process	Training and placement cell
		01.30-04.30	Talents hunt Activity: (Street Play/Mime/Acting/Stand Up Comedy /Dance etc.)	Seminar hall
9	9	09.30-12.30	Personality development talks by eminent speakers on - Leadership styles/How to handle failures/stress management	Seminar hall
		01.30-04.30	Importance of student union, student union activities, Student insurance, How to make student insurance by Student welfare officer of college	Seminar hall
10	10	09.30-12.30	Awareness on: Student scholarship- introduction to SSP portal – e-pass portal-Authenticated documents, how to apply in portal: Talk by Taluk/District social welfare officer	Seminar hall

		01.30-04.30	Local visits to surrounding places/Industry	Tour
11	**11**	09.30-12.30	**Talk on** Respective Program scheme of studies and detail of courses, Diploma examination pattern, Passing and eligibility criteria, attendance requirements by respective program coordinator	Department Class rooms
		01.30-04.30	Visit to respective programs lab/work shops of institution	Tour
12	**12**	09.30-12.30	Awareness camp on human health ,Community health, Personal hygiene-By Local Taluk medical officer/Community medical officer	Seminar hall
		01.30-04.30	Collection of student feedback on induction program- Make a report Valedictory of two weeks Induction program by collecting student feed back	Seminar hall

Induction Program (mandatory)	**Two- week Duration**
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative arts • Universal human values • Literacy • Proficiency modules • Lectures by Eminent People • Visits to Local Areas • Familiarization to Dept./Branch & Innovations

5.0 MANDATORY VISITS/WORKSHOP/EXPERT LECTURES:

1. It is mandatory to arrange one industrial visit every semester for the students of each branch.
2. It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.
3. It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

6.0 EVALUATION SCHEME:

A. For Theory Courses:

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded

B. For Practical Courses:

The weightage of Continuous Internal Evaluation (CIE) is 60% and for Semester End Exam (SEE) is 40%. The student has to obtain minimum of 40% marks individually both CIE and SEE to pass. The practical Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration exams). Based on this grading will be awarded.

C. For Summer Internship / Projects / Seminar etc.

1. Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note:

A. The Continuous Internal Evaluation (CIE) is based on the student's performance in Internal Assessment tests, student activity, mini project, quizzes, assignments, seminars, viva-voce in practical, lab record etc. as specified in respective course curriculum.

B. **Major Project/Mini Project:** Students can do their major project in Industry or R&D Labor in house. Mini Project is a laboratory oriented course which will provide a platform to students to enhance their practical knowledge and skills by development of small systems/application.

C. **Personality and character development:** It is mandatory for the students from 1st semester to enroll in any one of the personality and character development programmes (NCC/NSS/YRC/Yoga/Technical Club) and undergo training for their Personality and character development.

- National Cadet Corps (NCC).
- National Service Scheme (NSS) will have social service activities in and around the Institution.
- Youth Red Cross (YRC) will have activities in and around the institution.
- Yoga
- Technical Clubs.

D. **Internship:** A minimum of 10 credits (400 Hours) of Internship/ Entrepreneurial activities / Project work/ Seminar and Inter/ Intra Institutional Training may be counted toward three-year diploma programme.

E. **Mapping of Marks to Grades:** Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Level	Assigned Grade	Grade Point
91-100	Outstanding	A+	10
81-90	Excellent	A	09
71-80	Very Good	B+	08
61-70	Good	B	07
51-60	Above Average	C+	06
45-50	Average	C	05
40-44	Satisfactory	D	04
<40	Fail	F	00
Fail due to shortage of attendance and therefore, to repeat the course/semester.		F*	00
Fail in Continuous internal Evaluation (CIE).		F**	00
Note: Those Candidates who have not obtained requisite minimum pass marks in CIE are not eligible to take up SEE in that course until they get requisite minimum pass marks in the CIE. They may re- register for the CIE in the subsequent regular semesters by paying prescribed examination fee.			

SGPA and CGPA Calculations	
Semester Grade Point Average (SGPA)=	∑[(Course Credits earned)X(Grade Points)] for all the courses in that semester
	∑[Total Course credits applied] for all the courses in that semester
Cumulative Grade Point Average(CGPA)=	∑[(Course Credits earned)X(Grade Points) for all courses, excluding those with F*/F** grades until that semester
	∑[Total Course Credits earned] for all Courses excluding those with F*/F** grades until that semester
Note: The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the semester Diploma marks /grade card.	

A. SGPA and CGPA Calculations: An illustrative example for one academic year

Semester	Course Code	Credits Applied (CA)	Result Grade	Grade Points (GP)	Credits Earned (CE)	Credit points (CP=CE x GP)	SGPA, CGPA
I	Course 1	4	B	7	4	4x7=28	SGPA=CP/CA =110/22 = 5.00
I	Course 2	4	F	0	0	0x0=00	
I	Course 3	4	Absent (F)	0	0	0x0=00	
I	Course 4	4	A	9	4	4x9=36	
I	Course 5	2	A+	10	2	2x10=20	
I	Course 6	2	D	4	2	2x4=08	
I	Course 7	2	A	9	2	2x9=18	
	Total	22			14	110	***SGPA = 5.00***

Note: In 1st semester grade/marks card only SGPA is reported. From 2 d semester onwards both SGPA & CGPA will be reported in the grade/marks card.

Semester	Course Code	Credits Applied (CA)	Result Grade	Grade Points (GP)	Credits Earned (CE)	Credit points(CP=CE x GP)	SGPA, CGPA
II	Course 1	4	B	7	4	4x7=28	SGPA=CP/CA =100/19 = 5.26
II	Course 2	4	A	9	4	4x9=36	
II	Course 3	3	D	4	3	3x4=12	
II	Course 4	3	Absent (F)	0	0	0x0=00	
II	Course 5	2	A+	10	2	2x10=20	CGPA = CP/CE =(110+136)/(14+22) = 246/36 =6.83
II	Course 6	1	D	4	1	1x4=04	
II	Course 7	2	F	0	0	0x0=00	
		19			14	100	
I Semester Back log courses							
I	Course 2	4	C	5	4	4x5=20	
I	Course 3	4	D	4	4	4x4=16	
	Total	27			22	136	

- Total credits of the semester excluding the credits of the courses under F/F*/F** grade are considered for the calculation of CGPA of the two consecutive semesters under consideration.

B. CGPA Calculation of the entire programme: An Illustrative Example.

Semester	I	II	III	IV	V	VI	Total
Credits of the Semester	22	19	24	24	24	24	137
∑CP	110	136	184	155	191	188	964

$$CGPA = \frac{[110+136+184+155+191+18]}{22+19+22+24+24+24} = \frac{964}{137} = 7.04$$

P=Percentage Conversion= (CGPA-0.75) X 10

Class Declaration:

After the conversion of final CGPA into percentage of marks (P), a graduating student is declared to have passed in:

(i) First Class with Distinction (FCD) if P ≥ 70%

(ii) First Class (FC) if P ≥ 60% but <70% and

(iii) Second Class (SC) if P < 60%.

SCHEME OF STUDIES
DIPLOMA IN CIVIL ENGINEERING
(C-20)

I 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 marks)	Assigned Grade	Grade Point	SGPA and CGPA
				L	T	P			Max	Min	Max	Min					
THEORY COURSES																	Only SGPA for 1st Semester
1	ES/CE	20CE11T	Construction Materials	4	0	0	4	4	50	20	50	20	100	40			
PRACTICAL COURSES																	
3	EG/SC/CE	20EG01P	Communication Skills	2	0	4	6	4	60	24	40	16	100	40			
3	BS/SC	20SC02P	Statistics and Analytics	2	0	4	6	4	60	24	40	16	100	40			
4	ES/CS	20CS01P	IT Skills	2	0	4	6	4	60	24	40	16	100	40			
AUDIT COURSES																	
5	AU/SC	20AU01T	Environment Sustainability	2	0	0	2	2	50	20	-	-	50	20			
6	AU Physical Activity		Sports/NCC/NSS/Youth Red Cross/Yoga/ Technical club.	Student shall enrol in any one of these activities in 1st semester and shall participate actively. The student shall obtain 'Participation Certificate' in the activity to get eligible for the award of Diploma.													
Total				**12**	**0**	**12**	**24**	**18**	**280**	**112**	**170**	**68**	**450**	**180**			

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. AU- Physical Activity- Student participation in the selected physical activity shall be monitored and the participation record shall be maintained by the respective Programme Coordinator (Head of Section).
3. Theory course Semester End Examination (SEE) is conducted for 100 marks (3 Hours duration)
4. Practical course CIE and SEE is conducted for 100 marks (3 Hours duration)

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)

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

Course Code	20CE11T	**Semester**	I
Course Title	**CONSTRUCTION MATERIALS**	**Course Group**	Core
No. of Credits	4	**Type of Course**	Lecturing &Assignments
Course Category	Program Core Course	**Total Contact Hours**	4Hrs Per Week
			52Hrs Per Semester
Prerequisites	High school level science	**Teaching Scheme**	(L:T:P)= 4:0:0
CIE Marks	50	**SEE Marks**	50

RATIONAL

Materials for engineering play an important role as the vital tool for solving the problems of material selection and application in the civil Engineering construction field. Therefore, an engineering diploma student must be conversant with the properties, composition and behavior of materials from ***the point of view of reliability, sustainability and performance in civil engineering construction***. The study of basic concepts of materials will help the students understanding civil engineering subjects where the emphasis is laid on the application of thesematerials.

1. 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) To learn about various construction materials, and understand their relevant characteristics.
2) To be able to identify suitability of various materials for different construction purposes.
3) To know about natural, artificial, and processed materials available for various purposes of construction activities.

2. COURSE OUT COMES

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

CO1	Identify relevant natural construction materials.
CO2	Select relevant artificial construction materials
CO3	Identify and use of processed construction materials.
CO4	Select relevant special type of construction materials.

3. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS

CO	Course Outcome	PO Mapped	Cognitive Level R/U/A	Theory Sessions In Hrs	Allotted marks for SEE on cognitive levels		TOTAL
					R	U	
CO1	Identify relevant natural construction materials.	1,4.7	R,U	15	30	30	60
CO2	Select relevant artificial construction materials.	1,4.7	R,U	21	40	40	80
CO3	Identify and use of processed construction materials.	1,4.7	R,U	10	20	20	40
CO4	Select relevant special type of construction materials.	1,4.7	R,U	06	10	10	20
		Total Hours of instruction		**52**	**Total marks**		**200**

4. DETAILS OF 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

UNIT NO	Unit skill set (In cognitive domain)	Topics/Sub topics		Hours L-T-P
UNIT-1 Natural Construction Materials **CO1**	1.Identify rocks based on geology of its origin 2.Explain the requirements and characteristics of stones 3.Explain the methods of Quarrying of stones 4.Explain the methods of deterioration of stones 5. Explain the methods of preservation of stones 6. Mention the properties of sand and its uses 7.Explain the classification of Coarse aggregate according to size 8. Explain the structure and properties of timber 9. apply the use of Bamboo in construction	1.1	Geological classification of Rocks	15-0-0
		1.2	Requirements of good building stone	
		1.3	General characteristics of stone	
		1.4	Quarrying of stones by wedging	
		1.5	Quarrying of stones by blasting	
		1.6	Deterioration of stones	
		1.7	Preservation of stones	
		1.8	Properties of sand and uses	
		1.9	Classification of coarse aggregate according to size	
		1.10	Structure of timber	
		1.11	General properties and uses of good timber	
		1.12	Different methods of seasoning for preservation of timber.	
		1.13	List various Defects in timber	
		1.14	Use of bamboo in construction	
		1.15	Asphalt-properties and uses	

	10. Mention the properties and uses of Asphalt.			
UNIT-II **Artificial Construction Materials** CO2	1.Explain the constituents and characteristics of Bricks 2. Perform Field tests on Bricks 3. With a neat diagram able to explain manufacturing process of bricks 4. Write the properties of Aerated Concrete Blocks 5.Identify different varieties of Floor tiles and wall tiles, Glazed tiles and vitrified tiles 6. With a neat diagram able to explain manufacturing process of cement. 7. Identify different types of cement and mention their uses. 8. Explain properties and uses of Precast hollow and solid concrete blocks and pavement blocks. 9. Explain and identify Plywood Particle board, veneers and laminated boards 10 Identify and explain uses of different types of glasses. 11. Explain the properties and uses of Ferrous, Non- ferrous and alloys.	2.1	Constituents of Good brick earth	21:0:0
		2.2	Modular and Standard bricks	
		2.3	Special bricks –fly ash bricks	
		2.4	Characteristics of good brick	
		2.5	Field tests on Bricks	
		2.6	Manufacturing process of burnt clay brick	
		2.7	Clamp burning of Bricks	
		2.8	Hoffmann's kiln	
		2.9	Aerated concrete blocks-Properties and uses	
		2.10	Flooring and wall tiles – Clay tiles,	
		2.11	Glazed tiles and vitrified tiles	
		2.12	Manufacturing process of Cement–only dry process	
		2.13	Types of cement and its uses.	
		2.14	Properties and uses of Pre-cast hollow and solid concrete blocks	
		2.15	Properties and uses of pavement blocks	
		2.16	Artificial or Industrial Timber -Plywood, Particle board, Veneers	
		2.17	Laminated board and their uses.	
		2.18	Types of glass: Soda lime glass, Lead glass and Borosilicate glass and their uses.	
		2.19	Ferrous Metals- Cast Iron and Steel- List Properties and Uses	
		2.20	Non-ferrous metals- Aluminium, Copper, Zinc, - Properties and uses	
		2.21	Alloys- Aluminium Alloys and Steel Alloys- Composition, and uses	
UNIT-III Processed Construction Materials CO3	1.Explain the constituents and Uses of POP 2.Explain properties and uses of Fiber reinforced plastics 3. Explain properties and uses of Paints, Distempers, oil paints and varnishes and able to apply for different types of surfaces, 4. Know the manufacturing process and uses of Manufactured Sand. 5. Identify different Cladding materials.	3.1 Constituents and uses of POP (Plaster of Paris),		10-0-0
		3.2 Plastics- Properties and uses of plastics		
		3.3 Fiber reinforced plastic (FRP) its properties and applications		
		3.4 Paints and Distempers, Ingredients and their uses. Properties of good paint.		
		3.5 Oil Paints and Varnishes with their uses. (Situations where used).		
		3.6 Varnishes with their uses. (Situations where used).		
		3.7 Special processed construction materials; Geo synthetic, Ferro Crete.		
		3.8 Manufactured sand (m sand): its manufacturing and their uses.		
		3.9 Cladding materials-Terracotta,		
		3.10 High Pressure Laminates (HPL) Aluminium Composite panels (ACP), Glass Reinforced Concrete (GRC), Pre painted Galvanized Iron sheets.		

UNIT-IV **Special Constructi on Materials** **CO4**	1.Explain the types of water proofing materials, Termite proofing materials, and sound insulating materials and suitability of its different types in construction 2.Explain the properties and applications of Geopolymer cement 3. Explain the applications of Epoxy Resins, Non-Shrink Grounts	4.1 Water proofing material- Types and its suitability in construction	
		4.2 Termite proofing- Types and its suitability in construction	
		4.3 Sound insulating materials- Types and its suitability in construction,	
		4.4Epoxy Resins ,Non-Shrink Grouts Shotcrete-Applications	
		4.5 Gypsum and its products :Types and its suitability in construction	
		4.6 Properties and uses of Geo polymer cement	

MAPPING OF CO WITH PO

CO	**Course Outcome**	PO Mapped	UNIT Linked	Cognitive Level **R/U/A**	Tutorial & Practical Sessions in Hrs
CO1	Identify relevant natural construction materials.	PO1,PO4, PO7	1-4	U/A	15
CO2	Select relevant artificial construction materials.	PO1,PO4 PO7	1-4	U/A	21
CO3	Identify and use of processed construction materials.	PO1,PO4 PO7	1-4	U/A	10
CO4	Select relevant special type of construction materials.	PO1,PO4 PO7	1-4	U/A	06
					52

Level of Mapping PO's with CO's

Course	**CO's**	**Programme Outcomes (PO's)**							**Programme Specific outcome (PSO's)**	
		1	2	3	4	5	6	7	1	2
Construction Matals		3	-	-	1	-	-	1	3	2
	CO2	3	-	-	1	-	-	1	3	2
	CO3	3	-	-	1	-	-	1	2	2
	CO4	3	-	-	1	-	-	1	2	2
	Average	**3**		**-**	**1**	**-**	**-**	**1**	**2.3**	**2**

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

5. INSTRUCTIONAL STRATEGY

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

1. Massive Open on line courses (MOOCS) may be used to teach various topics/sub topics.

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. About 15 to 20% of the topics/sub topics which is relative simpler or descriptive in nature is tobe given to the students for self directed learning

4. Arrange visits to nearby Construction sites/ Manufacturing Industries/ Academic institution having research centre facility /Research labs for various understanding of tests on Building Materials

5. Show Video/animation films to explain functioning of various application of materials in Civil Engineering domain

6. Use different instructional strategies in class room teaching

6. SUGGESTED LEARNING RESOURCES:

A. List ofBooks

S. No.	Author	Title of Books	Publication/Year
1	Ghose, D. N.	Construction Materials	Tata McGraw Hill
2	S.K. Sharma	Civil Engineering Construction Materials	Khanna Publishing House
3	Varghese.P.C	Building Materials	PHI learning, NewDelhi.
4	Rangwala, S.C.,	Engineering Materials	Charatorpublisher,Ahemdabad.
6	Somayaji, Shan	Civil Engineering Materials	Pearson education, NewDelhi
7	Rajput,R.K	Engineering Materials	S. Chand and Co. New Delhi.
8	Sood H.,	Laboratory Manual on Testing of Engineering Materials	New Age Publishers New Delhi.
9	Sharma C. P	Engineering Materials	PHI Learning, NewDelhi
10	Duggal, S. K	Building Materials	New International, NewDelhi.
11	S.S.Bhavikatti	Building Materials	Vikas Publishing House Pvt.Ltd.

B. List of Materials required

MATERIAL LIST

The following are the specification of the specimens required for demonstration during the lecture hours of "constructions materials" and number of specimens required

SN	Name of the MATERIALS	Specification	Required Number
	STONES		
1	Granite	Size of 10×6×4 cm	2NOS EACH
	Trap	Size of 10×6×4 cm	2NOS EACH
	Basalt	Size of 10×6×4 cm	2NOS EACH
	Sandstone	Size of 10×6×4 cm	2NOS EACH
	Limestone	Size of 10×6×4 cm	2NOS EACH
	Gneiss	Size of 10×6×4 cm	2NOS EACH
	Laterite	Size of 10×6×4 cm	2NOS EACH
	Marble	Size of 10×6×4 cm	2NOS EACH
	Quartzite	Size of 10×6×4 cm	2NOS EACH
	Slate	Size of 10×6×4 cm	2NOS EACH
	BRICKS & BLOCKS		
2	Bricks Ground moulded		2NOS EACH
	Table moulded		2NOS EACH
	Machine moulded (Wire cut)		2NOS EACH
	Soil stabilized blocks		2NOS EACH
	Concrete blocks (solid-hallow)		2NOS EACH
	Fly ash brick		2NOS EACH
	Fire bricks		2NOS EACH
	Autoclave aerated concrete blocks		2NOS EACH
	BINDING MATERIALS		
3	Cement	50 kg bag	Consumable
	White cement	1 kg bag	1NOS EACH
	Lime	5 kg bag	Consumable
	Clay	1 kg bag	1NOS EACH
	Fly ash	50 kg bag	1NOS EACH
	Plaster of Paris	1 kg bag	1NOS EACH
	Lime putty	1 kg bag	1NOS EACH
	White cement based putty	1 kg bag	2NOS EACH
	TIMBER		
	Teak	Size of 15×10×6 cm	2NOS EACH
	Honne	Size of 15×10×6 cm	2NOS EACH
	Sal	Size of 15×10×6 cm	2NOS EACH
	Casuarina	Size of 15×10×6 cm	2NOS EACH
	Deodar	Size of 15×10×6 cm	2NOS EACH
	Jackfruit	Size of 15×10×6 cm	2NOS EACH
	Mahogan	Size of 15×10×6 cm	2NOS EACH
	Mango	Size of 15×10×6 cm	2NOS EACH
	Neem	Size of 15×10×6 cm	2NOS EACH
	Silver oak	Size of 15×10×6 cm	2NOS EACH

	Bamboo.	20 cm length	2NOS EACH
	Industrial timber- Veneers	6×4 feet	
	Plywood (diff thickness)		
	Fibre board		
	Hardboard		
	Block board		
	laminated sheets		
FLOORING			
	Vitrified	2 × 2 feet	2NOS EACH
	Marble	1 × 1 feet	2NOS EACH
	Granite,	1 × 1 feet	2NOS EACH
	Pressed Clay tile	1 × 1 feet	2NOS EACH
	Interlocking pavers	60mm, 80mm thick	2NOS EACH
	Wooden flooring		2NOS EACH
GLASS			
	Plain	6 × 4 inch	3NOS EACH
	Dark cool	6 × 4 inch	3NOS EACH
	Brown cool	6 × 4 inch	3NOS EACH
	printed	6 × 4 inch	3NOS EACH
	Mesh glass	6 × 4 inch	3NOS EACH
	Wired glass	6 × 4 inch	3NOS EACH
	Glass bricks	6 × 4 inch	3NOS EACH
	Structural glass	6 × 4 inch	3NOS EACH
	Ribbed glass	6 × 4 inch	3NOS EACH
	Perforated glass	6 × 4 inch	3NOS EACH
	Foam glass	6 × 4 inch	3NOS EACH
	Fibre glass	6 × 4 inch	3NOS EACH
	Float glass	6 × 4 inch	3NOS EACH
	Toughened glass	6 × 4 inch	3NOS EACH
PAINTS			
6	Water based primer	1 litre	2NOS EACH
	Metal-wood & wall primer	1 litre	2NOS EACH
	Emulsion paint	1 litre	2NOS EACH
	Enamel paint	1 litre	2NOS EACH
	Cement paint (Snowcem)	1 litre	2NOS EACH
	Texture paints	1 litre	2NOS EACH
	French polish	1 litre	2NOS EACH
	Metallic paint	1 litre	2NOS EACH
	Distemper- Water based & weather proof exterior emulsion	1 litre	2NOS EACH
ROOFING MATERIALS			
9	Mangalore tiles		2NOS EACH
	Country tiles		2NOS EACH
	A C sheet		2NOS EACH
	Plastic sheets		2NOS EACH
	Non asbestos Hi tech roofing sheet		2NOS EACH
	Meta colour sheets		2NOS EACH
	Alpha sheet		2NOS EACH

	Corrugated aluminium sheets		2NOS EACH
	Puff sandwiched roofing sheets.		2NOS EACH
	Steel bars ϕ5,6,8,10,12,16,20,22,25mm	Each bar 1m length	2NOS EACH
	Binding wire	1 bundle	1KG
DECORATIVE MATERIAL			
	Acoustic ceiling board		
	Gypsum ceiling board		
	Fibre board		
	Pulp board		
	Straw board		
	Polystyrene		
	Thermocol		
	Hair felt		
CHEMICAL CONSTRUCTION MATERIALS			
	Epoxy resin (base and hardener)	1 kg	2NOS EACH
	Plasticizer	5 litre	2NOS EACH
	Super plasticizer	5 litre	2NOS EACH
	Carboxylic admixtures	5 litre	2NOS EACH
	Silicon paste	1 kg	2NOS EACH
	Water proofing compound	1 litre	2NOS EACH
	Cement Grouts	25 kg	2NOS EACH
	Epoxy grouts	1 kg	2NOS EACH
	Adhesives	1 kg	2NOS EACH
	Sealants	250gms	2NOS EACH
	Asphalt	1 kg	2NOS EACH
	Geogrids	6 × 4 feet	2NOS EACH

SUGESTED ACTIVITY

1. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples.
2. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples.

SUGGESTED LIST OF PROPOSED STUDENT ACTIVITYS

Note: The following activities should be accompanied by at least 2 staff members from the department with prior approval from the industry. The visit should be recorded in the form of a hand written report and photo graphs. Each student should also submit the proof of their visit. A group of minimum 6 students should be assigned each activity. (Each group should select minimum one activity from each unit)

UNIT-I	
1	Visit to Geological Survey of India and study Rocks and Mineral samples available in the Museum
2	Visit to any nearby stone processing industry or Showroom
3	Visit to nearby timber depot and study different types of timber, Conversion of timber, Measurements, seasoning and storing pattern and various defects, quality of good timber.
UNIT-II	
4	Visit to nearby Brick manufacturing site and study size of bricks, mould and manufacturing

	process. Clamps and Kiln burning process of Bricks
5	Visit to nearby Hollow or solid concrete Block manufacturing site
6	Visit to nearby cement manufacturing plant and study manufacturing process
7	Visit to Plywood Retail Store and collect samples of Industrial timbers
8	Collect Market forms of Ferrous and Non ferrous metals
9	Collect different types of glass available in the market and explain its uses
10	Visit to nearby Tiles manufacturing industry or Visit to nearby Tiles show room and study different types of tiles available in the market its suitability and sizes and rates should be documented while visit.
UNIT-III	
10	Visit to nearby paint showroom or stores and study different types of paints available in the market.
11	Visit to nearby M sand manufacturing plant
12	Visit to nearby roofing and cladding materials sales showroom and study its different types and market rates and suitability of their use in construction
UNIT-IV	
14	Visit to a construction site where water proofing is under progress and study methodology adopted in water proofing.
15	Visit to a construction site where termite proofing and sound insulating is under progress and study methodology adopted in water proofing.

COURSE ASSESSMENT:

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 30marks
2.	CIE Assessment 2 (Written Test -2) - At the end of 7 week	80 minutes		
3.	CIE Assessment 3 (Written Test -3) - At the end of 13 week	80 minutes		
4	CIE Assessment 4 (MCQ/Quiz) - At the end of 5 week	60 minutes	20	Average of three 20marks
5	CIE Assessment 5 (Open book Test) - At the end of 9 week	60 minutes		
6	CIE Assessment 6 (Student activity/Assignment)- At the end of 11 week	60 minutes		
7.	Total Continuous Internal Evaluation (CIE) Assessment			50marks
8.	Semester End Examination(SEE) Assessment (Written Test)	3 hrs	100	50marks
Total Marks				**100marks**

COURSE ASSESSMENT AND EVALUATION CHART

Assessment Method	Type of Assessment		Target	Assessment methods		Max Marks	Type of record	CO's for assessment
Direct Assessment	CIE Continuous Internal Evaluation	I A Testes	STUDENT	Three Tests (Average of Three Tests will be Computed)		30	Blue Books	CO1 CO2, CO3 CO4
		Assignment & Student activity		MCQ/QUIZ	20	20 **(Average)**	Log of record	Specified CO by the course coordinator
				Open Book Test	20			
				Student activity	20			
				Total CIE Marks		50		
	SEE	Semester End Exam		End of the Course		50	Answer Scripts by BTE	All CO's
				Total		100		
Indirect Assessment	Student feedback		STUDENT	Middle of the course		-NA-	Feedback forms	CO's which are covered
	End of Course survey			End of course			Question-naire	All CO's Effectiveness of delivery of instructions and assessment methods

RUBRICS FOR ACTIVITY (Example Only)						
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**

Note: Concerned	**faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity.**

Note: Dimension should be chosen related to activity and evaluated by the course faculty

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)					

Model Question Paper
Semester End Examination

Programme:	**Semester: I**
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)				

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

Course Code	20EG01P	**Semester**	I/II
Course Title	**COMMUNICATION SKILLS**	**Course Group**	Core
No. of Credits	4	**Type of Course**	Tutorial + Practice
Course Category	Workplace Skills / Humanities & Social Sciences	**Total Contact Hours**	6Hrs Per Week 78Hrs Per Semester
Prerequisites	Nil	**Teaching Scheme**	(L:T:P)= 0:1:2
CIE Marks	60	**SEE Marks**	40

Preamble

Today, Communication is a very important skill for the success of every millennial student. Millennials affinity to use digital media for communication, changing career and working landscapes, and greater competition in colleges and workplaces makes enhancing student communication skills beyond language a must. Rote learning a few tips or tricks the night before an interview or performance review won't do the job if students are trying to make an impression in highly collaborative workplaces of the future. Expectations from students aspiring to be part of such future workplaces are that they have not just good verbal and non-verbal communication skills but also a good understanding of how to use modern tools for effective communication.

Scope

To enable students to communicate clearly and effectively, by improving their verbal and non-verbal communication skills, as well as enhancing interpersonal skills and knowledge of appropriate tools for specific communication strategies.

Course Objectives

The objectives of communication skills course are:

- Build better communication skills: oral and written expressions and body language
- Enable critical thinking
- Empower with active listening skills
- Enable team work/collaboration

Instructional Strategy

To achieve course objectives, it is important to provide the blended mode of instruction for each of the concepts. This blended mode of instruction enables and empowers students with:

- **Understanding of Concept (Theory):**
  - Through definitions, discussions, explanation, conclusions.
  - Through demonstrations: Show films or other workplace clips that model various conversation skills. This provides greater clarity of the concept by
    - Enabling observation skills

        - Helping in expression of gesture
        - building confidence
- **Application of Concept (Learning by doing):** It is imperative that to become a good communicator, the skills have to be built by applying the concept in the hypothetically created real life situations. Students are encouraged to participate in each of these activities during lab session to help build the effective communication skills.
    - Use of technology tools like audio books, apps like voice thread or paper telephone, etc.
        - To help in workplace conversions.
        - To increase active listening, pronunciation
        - To help in voice modulation
    - Group discussion
        - Reinforce active listening
        - Enable group debate to imbibe healthy communication strategies
        - Sharpen the skills of "Asking clarifying questions"
        - Sharpen Feedback / Response skills
        - Time management skills
    - Group presentations/peer reviews
        - Enable team work
        - Assess concept understanding
        - Sharpen both oral and written communication skills
    - Group activities:
        - foster critical thinking
        - enable reflective learning
    - Tools usage:
        - Understand the difference between a Dictionary and a Thesaurus
        - Understand "When" and "How" to use these tools for communication

Course Outcomes

After completion of this course, the student shall be able to;

- Communicate
    - Identify audience (colleagues, management, customers/vendors)and use the right methodologies for communication using the right terminology, names, grades and other nomenclature pertaining to the trade, tools and specific equipment.
- Write
    - in at least one language correctly
    - basic level notes and observations
    - job cards, work sheets, basic report writing and responding to emails, simple presentations, job applications, resume
- Read
    - Technical manuals, task sheets/job orders, policies and regulations pertinent to the job, including OEM guidelines.
    - all instructions given in memos, manuals, documents or those put up as posters across the premises
    - safety precautions mentioned in equipment manuals and panels to understand the potential risks associated
- Question
    - Ask right questions
    - Use different ways of asking questions
        - Clarifying/Open ended (What, Why, When, Who, Where, How)
        - Close ended

- Present
    - With right Posture & Gesture
    - With greater concept/content clarity
    - With high confidence
    - With voice modulation to capture the attention of audience

- Use technology tools
    - Office productivity
        - Word : Report writing
        - PowerPoint : Creating effective presentations
        - Excel : Data handling/Charts

Course Content

The following are the various units to be taught and assessed in order to ensure the student is able to demonstrate the Course Outcomes mentioned in the **Course Outcome** section.

Pre-assessment:

Teachers are required to administer pre-assessment before starting the actual instruction. This helps in gathering information about students' like their attitude, beliefs, interests, and learning abilities.

Pre assessment expectations:

- To assess current language skill (Pronunciation, usage, sentence formation)
- To assess their ability to comprehend and respond to the instruction
- To assess their interest towards accepting ideas and learning
- To assess their current communication skills: asking questions, listening, communicating with confidence

UNIT 1: English – Introduction

Learning outcome:

Learn English pronunciation, functional grammar concepts& Reading. To gain confidence in spoken English.This section also covers phonemic awareness, grammar rules to set a strong base for application mode of communication.

Phonemic awareness	**Going over 42 sounds**	***Examining the understanding of sounds*** ***Spelling patterns (Consonant and Vowel blending: CVC words)*** ***Pronunciation*** o List of words given above (Commonly used words) o Diction (speech)	0:2:2
Functional Grammar Concepts	**Revision of Grammar concepts**	***Parts of speech*** ***Sentence structure*** ***Examples of right sentences*** ***Gender, Singular, Plural*** ***Usage of voice (active and passive) and tenses***	2:0:0 0:1:0 0:1:0 0:2:0
Comprehension activities	**Reading conversations (check the unit wise activity table)**	***Written test for each comprehension***	0:0:2

UNIT 2: Communication

Lesson outcome:

At the end of the session:

- Students should be able to
  - Understand the communication process, influence of voice/tone, logical organization of thought, comprehension, listening skills.
  - Understand the basic building blocks of communication and strategies for working with each of these blocks.
  - Learn about carrying self, etiquettes of communication.
  - Build positive attitude about self and towards handling communication.
  - Learn the process for effective communication, problem solving techniques, to be confident communicator.

INTRODUCTION:	**What is communication?** **Why communication?** **How do we communicate?** **Communication Theory and Process**		1: 2:0 0:2:2

	Barriers to communication	***How communication happens?*** • Pictorial representation of communication framework • Elements of communication: sender, receiver, message • Refer to activity in Unit activity section. ***Language*** • Lack of linguistic ability • Grammar ***Context*** • Psychology • Physiology ***Systematic*** • inefficient or inappropriate information systems • Lack of communication channel • lack of understanding of the roles and responsibilities ***Attitude*** • Perceptions • Preconceived notions	0:2:2 (video clip play, content tutorial, role play)

Building blocks of communication	**People** **Message** **Context** **Listening**	***People:*** • Empathising with sender's or receiver's perception • Intent & Impact on the sender/receiver • Think – Feel – Do model ***Message:*** Message channels: o Inperson, **email**, memo, report Be aware of Mental Filters o Level of understanding/knowledge o Personal concerns o Pre conceived notions Organize message: o Critical thinking: organize your thoughts? Use following strategy: ▪ Who ▪ What ▪ When ▪ Why ▪ How o Bundle Primary and Secondary information o Mindful about non-verbal message o Tone of voice Examples of Types of messages: o Inform o Persuade o Cyclical Avoiding Miscommunication: • Evaluate (Checking for) understanding of the intent of the message with the receiver – by asking clarifying questions? ***Context:*** Define context Importance of context Tune into context • Timing • Location • Relationship	0:4:4

		Listening: Importance of listening Barrier to listening: • Mental filters • Multitasking • Information overload Strategies for listening: • Recall • Acknowledge • Summarize • Listen with eyes for connecting to non-verbal connection • Empathize • Pay attention • Ask clarifying questions Effective Listening Behaviors: • Maintaining relaxed body posture • Leaning slightly forward if sitting • Facing person squarely at eye level • Maintaining an open posture • Maintaining appropriate distance • Offering simple acknowledgements • Reflecting meaning (paraphrase) • Reflecting emotions • Using eye contact • Providing non-distracting environment Behaviors that hinder effective listening • Acting distracted • Autobiographical (Telling your own story without acknowledging theirs first) • No response • Invalidating response, put downs • Interrupting • Criticizing • Judging • Giving advice/solutions • Changing the subject • Reassuring without acknowledgment	

UNIT 3: Verbal Communication

Lesson outcome:

At the end of this session, Students should be able to:

- Understand and define the communication framework structure for each of the verbal communication(in person/telephonic/video conference).
- Understand and apply the verbal communication techniques.
- Use technical jargons in communication.
- Use right body language during verbal communication
- Understand and practice the Active Listening techniques
- Confidently articulate or present the content

Different types of verbal communication:	***In person*** ***Telephonic*** ***Video conference***	Use ABC's : Accuracy, Brevity, Clarity ○ Introduction ○ Main body of the content ○ Summary • Use voice/tone effectively • Reinforcement of Listening skills: Active and Empathetic listening skills • Body language ○ Eye contact ○ Body posture ○ Gesture ○ Facial expression ○ Space	**0:2:4**
Listening Skills	***Effective Listening behaviors***	Effective Listening Behaviours**:** • Maintaining relaxed body posture • Leaning slightly forward if sitting • Facing person squarely at eye level • Maintaining an open posture • Maintaining appropriate distance • Offering simple acknowledgements • Reflecting meaning (paraphrase) • Reflecting emotions • Using eye contact • Providing non-distracting environment	
	Behaviours that hinder effective listening	Behaviours that hinder effective listening • Acting distracted • Autobiographical (Telling your own story without acknowledging theirs first) • No response • Invalidating response, put downs • Interrupting • Criticizing • Judging • Giving advice/solutions • Changing the subject • Reassuring without acknowledgment	
Using technical Jargons:	*Assignment based project encouraging pupil to use the*		

	technical terms in the written and verbal communication. This requires understanding of the core concepts (from subject teacher) and integrating the concept with communication concepts to gain the real time application knowledge.		

UNIT4: Non-Verbal Communication:

Lesson outcome:

At the end of this unit, students should be able to:

- Understand the importance of Body language and its impact.
- Use the strategies for effective body language.
- Understand the relevance of different elements of emails and how to use them.
- Develop the confidence in presenting written content in logical and organized manner with a definitive email framework.
- Write different email formats confidently: Job application, Request email, apology email, email responses/feedback.
- Confidently write Resume/Curriculum-vitae, Reports, Formal letters and portfolio.
- Confidently communicate using technical jargons and with increased vocabulary.

Body Language	***Strategies***	Body language tips: • Keep appropriate distance • Take care of your appearance • Maintain eye contact • Smile genuinely Do's and Don'ts: dos: • smile • stand up confident and straight • use appropriate hand gestures • Make eye contact with audience • Hold neat note cards while presenting content Don'ts • point at anyone • rock backwards and forwards • pace across front of room • read off slides read off notes	0:3:4
Art of Professional writing:	***Written communication*** ***Emails:*** • Structured framework for writing formal emails to emphasize on professional communication in English	Different types of emails: Job application, request letter, letter writing and quick notes Structure of email text: • Introduction – Beginning of the letter and this plays crucial role as it provides first impression to the reader. o Who: author (name + position and organisation) o what: purpose - controlling idea (what author does or feels) • Development: Expand on the Controlling Idea/purpose of the email by answering relevant WH questions o what, when, where, who, whom, which, whose, why, and how • Conclusion: Positive words o Verb: thank, appreciate, hope, wish	0:2:4

		○ Phrases: be glad about, look forward to Email writing samples and practice content in the activity section. Additional essential writing skills – Framework will be provided and assignments will be advised: • Resume writing /CurriculumVitae • Report Writing • Portfolio writing • Formal letters	
UNIT5: English - Reading Skills, Grammar & Vocabulary **Lesson Outcome:** At the end of the session, student should be able to: • Read sentences with punctuation. • Understand the techniques of reading complex words. • Understand and apply the reading techniques for efficient reading. • Understand the usage of communication tools like Thesaurus and Dictionary that aids in improving vocabulary and reading. • Understand and apply the functional grammar aspects in day today communication.			
	Comprehension activities ***Techniques for smart reading***	Passage comprehension Conversation comprehension Strategies for smart reading: • Skimming and scanning through the text, inferring the meaning • Questioning, summarizing	0:2: 2
	List of Commonly confused words and how to use/avoid them	Set of words to accelerate the English language learning and usage. Strategies to use these words effectively	0:1: 2
	Sentences: ○ Declarative sentence	Techniques of categorizing sentences, understanding how to build with punctuation and effectively use in the	0:1: 2

Reading skills **Functional Grammar** **Vocabulary**	○ Imperative sentence ○ Interrogative sentence ○ Exclamatory sentence ***Punctuation, Content organization and Comprehension*** ***Techniques:*** • Learning new words from comprehension by way of repetition and usage of these words in communication • Listing technical jargons and repeatedly using in the communication with peers and teachers • Chunking and reading words ***Tools*** • Understand the difference between a Dictionary and a Thesaurus • Understand "When" and "How" to use these tools for communication	verbal and non-verbal communication. This involves more of hands on activities. Comprehension remains as a main activity to accelerate the learning of spoken and written English language Increases vocabulary, builds confidence and helps in becoming a good communicator. Activities are done, tips are provided to efficiently implement these strategies.	0:1: 2 0:1:0

Unit 6 - Communication Tools

Lesson Outcome:

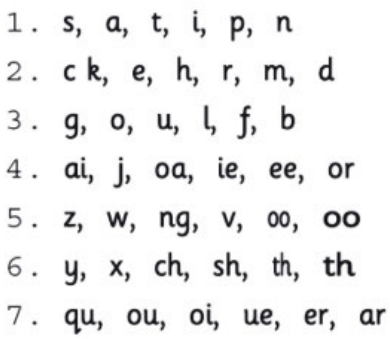
At the end of the session, student should be able to:

- Use Email technology efficiently for communication
- Present content in the PPT format efficiently
- Understand different platforms available for web conferencing and efficiently work with them.
- Create reports and data management.

Introduction	Evolution of communication tools	Traditional vs. modern communication tools Advantages and Disadvantages	1:0:0
One-to-One	***Email using Gmail***	How to use the tools effectively? Formatting, layout Including attachment Working with "To, CC, BCC" and Subject fields effectively Using signature	0:1:1
One-to-Many	***Presentation using PowerPoint***	Creating, Editing, Saving slides Using Animation Formatting options	0:1:2
	Webinar / Web Presentation (zoom, Google meet, Skype)	Hosting online meeting using online meeting tools Inviting people Sharing screen	0:1:1
Other	***Reports using MS Word***	Open, close, Edit and Save usage with documents Layout and strategies for creating report Sample report creation demo with follow on assignment Core subject project report submission assignment	0:1: 2
	Data & Graphs using MS Excel	Open, close, save and edit the excel document Creating data Using basic maths operation in Excel for working with data Creating simple graphs Assignment: For example, creating statistics of subject wise activities completed for 6 months in the credit course	0:1: 2
			4:34:40

Course Class Activity List (Unit-wise)

The following are the various activities that faculty could conduct for each unit are presented below;

Unit No.	Unit Title	Unit Activities
UNIT 1: Activities:	**English – Introduction**	1. 42 sounds revision:  1. s, a, t, i, p, n 2. c k, e, h, r, m, d 3. g, o, u, l, f, b 4. ai, j, oa, ie, ee, or 5. z, w, ng, v, oo, oo 6. y, x, ch, sh, th, th 7. qu, ou, oi, ue, er, ar • This helps in reducing the native language impact • Helps in understanding Short and Long vowel words • Helps in spelling • Helps in pronunciation 2. Reading commonly used words loud from the list (list will be provided in the workbook): • This helps in getting familiarity with the word pronunciation and helps in reading. 3. Blending words activity: • Write simple three letter words (CVC/CVCC/CVCV) pattern words: Can, Cap, Snap, cape (list will be provided in the workbook) • Show how to blend with the sound. • Starting with 3 letter words and continuing to 6 to 8 letter words. *Note: Remember before going through big words, it is always important to assess and ensure the student is aware of all the 42 sounds and are comfortable making small words.* Parts of Speech: building sentence using parts of speech: Demonstration by teacher: (Will be explained in the book as an example) Jumbled parts of speech: Student should pick the right order to build meaningful sentence: (More samples will be provided in the workbook) • College go to youeveryday. • Makes spider web the a

		Gender, Singular and Plurals: • Match the following activity for singular and plural • Fill in the blanks activity for genders Reading & Comprehension: Conversation • Conversation at the bank (provided in the workbook along with few more conversation samples) • Questions based on this conversation will be provided in the workbook
Unit 2	**Communication**	Oral: • Introduce yourself? Visual: • Video clip on communication etiquette • Pictures (in addendum section): do's and don'ts of communication Group of students, one participant whispers in another participant's ear, and this message has to be passed on in a circle until it reaches back the sender. Making a note of process of message conveyed and how it was perceived. o Identify the communication gap if any. o Discuss and conclude the communication framework importance o Discuss/reiterate how to make communication framework strong. 1. Role play to assess the understanding of building blocks of communication: (can be tapered to the core skills of diploma courses, following are just few of the examples) a. Announcing the result of students in the class or b. Announcing the job placement of students (people, context, message, form of message) c. Discussing the guidelines of examination (listening skills) d. Listening to the weather forecast without seeing and making note of the listening

		ability (play video of weather forecast) – Assess based on how much the student is able to recall. 2. Run National geography/Discovery Video clip/subject related technical video clip on YouTube: Check: o if the student has not understood what a speaker expressed o about work or safety related issues o seeking clarification or advice appropriately from colleague, customer, management or vendor
Unit 3	**Verbal communication**	1. Voice/tone modulation: Showcase video Discussion: What was right? What was wrong? How it should have been better? 2. Picture description activity (memory test): Class split into groups A, B C,D: (two or four groups of at least 5 people each): Teacher shows different picture to each group for three minutes. Now each group has to remember what was on the picture and discuss with each other, write down the elements on a piece of sheet and share it with the teacher. Group that remembers more will be the winner. Teacher to observe the body language of a student in the group, listening skills of a student, presentation skill, comprehension skill, content delivery skill, confidence level, team work. And reiterate the concepts, dos and don'ts, and discuss what could have been done better. (details of pictures will be given in the workbook) 3. Telephonic conversation: Role play by a teacher: Call Airtel/Vodafone department and asking for the phone number portability process.

		After teacher demonstrates, teacher divides the class in to small groups of three people. • Each group will be given a different telephone conversation assignment (samples will be provided in workbook). • Two people in the group pretend to converse over the phone, and the third person makes a note of right and wrong approaches during the communication.
Unit 4:	**Non-verbal communication**	Body language Simon Says: Instructions and set up : 1. Series of instructions to the group that are to be copied/reproduced. Start slowly and increase the pace 2. State the following actions as YOU do them: ○ Put your hand to your nose ○ Clap your hands ○ Stand up ○ Turn around ○ Touch your shoulder ○ Sit down ○ Stamp your foot ○ Cross your arms ○ Put your hand to your forehead – <u>BUT WHILE SAYING THIS PUT YOUR HAND TO YOUR NOSE</u> 3. Observe the number of group members who copy what you did rather than what you said. **Outcome of this activity:** Discuss how body language can reinforce/influence verbal communication and drive the importance of body language and how to work on it • Email communication & Using technical jargons: Sample letter writing as assignment to students. (list will be provided in the text book – Request, apology,

		job application and relevant email formats that are useful for students post diploma course) • There will be at least one assignment that utilizes technical jargons in email communication.
UNIT 5:	**English - Reading Skills, Grammar & Vocabulary**	• Reading passage (Provided in workbook) • Reading passage from the text book • Comprehension: Passage & Conversation (will be provided in workbook) • Chunking words and reading activities
Unit 6:	**Communication tools**	• Email writing activities: Writing emails using email provider. Theme based email writing • Report writing assignment Writing about a machinery tool/interior designing plan? Related to the diploma stream. • Resume writing assignment • Data handling: Collecting data about machines/number of students passed out of college for last three years and creating graph about it. • Presentation: o About learning in the communication class o Concept presentation

Course Assessment Strategies

Assessment Methodology

a. Observation (role play activities, team activities, demonstration)
b. Questions & Answer – Periodic Assessment

Assessment Grading RUBRICS

Language Basics	
Beginner	Doesn't know / understand
Intermediate	can read and identify commonly used words
Good	Confident , able to communicate well with known people
Advanced	Confident , able to communicate well with anyone using a English
Expert	Can read, understand; Also comprehend & can train others
Reading	
Beginner	Beginning to read, has native language impact
Intermediate	can read, identify words, build simple 3/4/5 letter words easily
Good	Can read, understand, build words, read simple sentences ; Also comprehend

Advanced	Can read, understand, build words, read simple sentences ; Also comprehend
Expert	Confident , read simple and complex sentences with punctuation, comprehend, spell also build words
Inter personal communication	
Beginner	is shy, doesn't talk/express
Intermediate	hesitates to communicate – due to lack of confidence / ability, can talk to known people
Good	can talk to unknown people, less confident, does not express, has hard time working as a team
Advanced	can talk to unknown people, confident, can't express, has hard time working as a team
Expert	confident, can talk to anyone, express well, works well in the team
Body language	
Beginner	Is shy, not open to communicate, has hard time making friends
Intermediate	Knows basics of Body language, practices sometimes
Good	Knows basics of Body language, practices most times, has less confidence in presenting content
Advanced	Knows and practices good body language all times, can present content
Expert	Knows and practices good body language all times, is an example, Leads the pack to get better
Listening Skills	
Beginner	Just hears, no attention
Intermediate	Listens, pays attention, does not ask any question
Good	Listens, pays attention, ask questions
Advanced	listens, pays attention, asks questions, cannot empathize
Expert	Listens, pays attention, asks clarifying questions, able to understand the message communicated
Acceptability to Learn	
Low	is not receiving to information
Average	receives information but resists to implement
Good , Above Average	receives information and implements per instructions
Strong	receives information and proactively implements and seeks feedback
Verbal Communication	
Beginner	Does not communicate, shy, low on confidence: has problem expressing in his/her native language or English language
Intermediate	Can communicate in native language, low confidence, shy, yet to try in English language
Good	Can communicate in native language, good confidence, tries to communicate in English language
Advanced	Can communicate in native language, express view points, good confidence, comfortable talking to people in the team, tries to communicate in English language aswell

Expert	Can communicate in native language, express view points, very good confidence, can communicate with anyone without any fear, asks clarifying questions, communicates well in English, or tries hard to communicate in English language as well
Non-Verbal Communication	
Beginner	Struggles to understand the non-verbal cues, has to work on body language, has hard time understanding the written communication aspects
Intermediate	Can understand the non-verbal cues, has to practice, tries to apply written communication aspects
Good	Can understand non-verbal cues, practices well, works hard to get hold on written communication skills, exhibits confidence in whatever task is given
Advanced	Can understand non-verbal cues, can work on written communication aspects, exhibits confidence, practices well, help others to identify non-verbal cues
Expert	Can understand non-verbal cues, train others, confident, exhibits good non-verbal cues at all times, can train the pack, has good hold on written communication as well.
Comprehension	
Beginner	Tries to read the passage, has hard time to comprehend
Intermediate	Can read the conversation passage, has hard time understanding the regular passage
Good	Can read the conversation passage, regular passage, but stutters in answering questions if there are technical jargons
Advanced	Can read the conversation passage, comprehend but regular passage comprehension is good
Expert	Can read the conversation passage, comprehend but regular passage comprehension is good, explain better to others, help others, lead the pack
Writing Communication	
Beginner	Has trouble forming right sentences for written communication
Intermediate	Can form sentences, has problem with the layout, gets confused between layout for different form of written communication
Good	Can form sentences, has fair understanding of the layout to be used for particular type of written communication, but stutters for words and expression
Advanced	Can form sentences, has good understanding of the layout to be used for particular type of written communication, confident, can express thoughts well
Expert	Can form sentences, has good understanding of the layout to be used for particular type of written communication, confident, can express thoughts well and train others and lead the pack

Recommended Learning Resources

https://www.englishclub.com/grammar/parts-of-speech.htm
Watch Amy Cuddy's TED Talk: Your Body Language Shapes Who You Are
Additional Reading: http://money.cnn.com/2000/05/03/career/q_body_language/

Pre-assessment:

Activity 1:
Make a group, read random words from the list, build sentence for few words from the list.

Create a group of 3 or 5 students. Randomly pick 5 words from the word list write down on the board/show them as a chart if you have created a word chart/make chit of words and ask them to pick one chit and READ the word.

Main idea: Testing the pronunciation ability, language ability, confidence in speaking, ability to understand and accept the instruction

Activity 2:
Simple reading test – Reading passages (Simple passage from the current course book)
Show the reading passage, let each one of them read 2 lines, after first student is done with reading two lines, then the next student must pick up from there and read next two lines. This process has to be followed until the entire class is done with reading or at least ten students are done with reading.

Main idea: Testing listening skills, attentiveness, language ability, pronunciation ability

Activity 3:
Students getting to know each other. Create a group of 3 or 5 students. Each student gets chance to talk to another student, introduce him/herself to the student, ask question, make a note of the answer against the name of the student who is answering the question on a sheet of paper.

Main idea: To assess current communication level, body language when students talk with each other, and confidence.

Commonly Used Word List

When	Today	For	Off		Yes	To	Girl	This	
Give	Stop	There	Often		On	Am	A	Could	
Again	Little	Than	Myself		Been	Where	You	Now	
Do	Large	At	Over		Of	Way	Be	Fun	
From	Both	Like	Along		He	Which	Were	Only	
Him	Name	Said	Why		It	Write	Or	Much	
Can	Few	They	Has		More	Goes	One	Tell	
Go	Home	Look	Bring		My	Great	All	Out	
But	Big	Know	Part		Any	Number		That	Fast
Old	Should	Done	By		Their	First	Cat	Is	
Not	Once	High	As		We	Find	His	Small	
Her	Thought		So	Into	She	Me	Have	Dog	
Time	Better	Them	Away		Did	In	How	See	
Long	Many	Does	No		Went	Before	Water	Here	
Had	Get	Always	Other		Full	Saw	And	People	
Word	Please	These	With		Some	Never	Use	School	
Very	Ask	Last	An		Then	Boy	Take	Two	
Your	Say	Got	What		If	Right	The	Call	
Make	Ten	Next	Come		Night	After	Will	Might	
Day	I	Those	Would		Made	About	Was	May	
Each	Show	Play	Who		Up	Far	Are	Walk	

To assess current communication skill: Activity based

Activity 3:

Making a group of students and getting to know each other with a predefined expectation for example:

Name:
I have performed on stage:
I'm good at sports:
I can speak more than 3 languages:
I'm always cheerful:
I like my mother tongue:

Course Assessment and Evaluation

Continuous Internal Evaluation (CIE)

Sl.No	Assessment	Schedule	Duration	Max. Test marks
1	Skill Test 1	At the end of 3rd week of the sem	2 Hrs	20
2	Skill Test 2	At the end of 7th week of the sem	2 Hrs	20
3	Skill Test 3	At the end of 13th week of the sem	2 Hrs	20
			Total	60

Scheme of Valuation for CIE

Serial no	Assessment	Marks
1	**Portfolio Evaluation of activities / exercises conducted upto the schedule of Skill Test. (Work Book Based)**	**10**
2	**Assessment of any one through qualitative assessment (Rubrics)**	**10**
	TOTAL	**20**

RUBRICS FOR ASSESSMENT OF ACTIVITY (10marks) (Qualitative Assessment)						
Dimension	Beginner	Intermediate	Good	Advanced	Expert	**Student Score**
	2	**4**	**6**	**8**	**10**	
	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	
	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	
	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	
	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	
					Average / Total Marks:	

Example Only
RUBRICS FOR ASSESSMENT OF ACTIVITY (10marks)
Faculty need to develop appropriate rubrics as per the assigned activity for assessment

Dimension	Beginner	Intermediate	Good	Advanced	Expert	**Student Score**
	2	**4**	**6**	**8**	**10**	
Language Basics	Doesn't know / understand	Can read and identify commonly used words	Confident , able to communicate well with known people	Confident , able to communicate well with anyone using a English	Can read, understand; Also comprehend & can train others	8
Reading	Beginning to read, has native language impact	Can read, identify words, build simple 3/4/5 letter words easily	Can read, understand, build words, read simple sentences ; Also comprehend	Can read, understand, build words, read simple sentences ; Also comprehend	Confident , read simple and complex sentences with punctuation, comprehend, spell also build words	6
Inter personal communication	Is shy, doesn't talk/express	Hesitates to communicate – due to lack of confidence / ability, can talk to known people	Can talk to unknown people, less confident, does not express, has hard time working as a team	Can talk to unknown people, confident, can't express, has hard time working as a team	Confident, can talk to anyone, express well, works well in the team	8
Body language	Is shy, not open to communicate, has hard time making friends	Knows basics of Body language, practices sometimes	Knows basics of Body language, practices most times, has less confidence in presenting content	Knows and practices good body language all times, can present content	Knows and practices good body language all times, is an example, Leads the pack to get better	8
				Average / Total Marks: (8+6+8+8)/4		**7.5 = 8 marks**

Scheme of Valuation for Semester End Examination (SEE)

Serial no	Assessment	Evidence	Marks	Conversion
1	**Portfolio Evaluation- UNIT 1: English – Introduction**	**Work Book**	**15**	**40 Marks**
2	**Portfolio Evaluation- UNIT 2: Communication**	**Work Book**	**15**	
3	**Portfolio Evaluation- UNIT 3: Verbal Communication**	**Work Book**	**15**	
4	**Portfolio Evaluation- UNIT-4: Non-Verbal Communication:**	**Work Book**	**15**	
5	**Portfolio Evaluation- UNIT-5: English - Reading Skills, Grammar & Vocabulary**	**Work Book**	**15**	
6	**Any one activity through communication tools- By qualitative assessment (Rubrics).**	**BTE Answer scripts**	**25**	
		TOTAL	**100**	

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

Course Code	20SC02P	**Semester**	I/II
Course Title	**STATISTICS AND ANALYTICS**	**Course Group**	Core
No. of Credits	4	**Type of Course**	Lecture and practice
Course Category	Practice	**Total Contact Hours**	6 Hrs. Per Week
			78 Hrs. Per Semester
Prerequisites	10TH LEVEL MATHEMATICS	**Teaching Scheme**	(L: T:P)-1:0:2
CIE Marks	60	**SEE Marks**	40

RATIONALE

Statistics and analytics help the learner to use the proper methods to collect the data, employ the correct analyses, effectively present the results and conduct research, to be able to read and evaluate journal articles, to further develop critical thinking and analytic skills, to act as an informed consumer and to know when you need to hire outside statistical help. The python language is one of the most accessible programming languages available because it has simplified syntax and not complicated, which gives more emphasis on natural language.

COURSE OUT COMES

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

CO1	Understand the tools of data collection, classification and cleaning of data.
CO2	Able to summarize the given statistical data
CO3	Understand the measure of location and dispersion of data.
CO4	Learn the basics of Python programming.

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 **STATISTICAL DATA COLLECTION AND TYPES**	➢ Able to collect statistical data. ➢ Able to distinguish the data types. ➢ Understands the usage of data collection tools ➢ Able to specify problem statement for data collection ➢ Able to collect data pointing the root cause of the problem statement.	a Definition of data and classification (qualitative quantitative discrete and continuous data). b Data collection tools i) Questionnaires. ii) Survey. iii) Interviews. iv) Focus group discussion. 1.3 Data cleaning.	4-0-8
UNIT-2 **SUMMARIZATION OF DATA**	➢ Sketches bar, pie and histograms on Microsoft Excel spread sheet. ➢ Sketches frequency curve and frequency polygon for the data set on Microsoft Excel spread sheet. ➢ Sketches bar, pie and histograms on Microsoft Excel spread	a Descriptive statistics v) Datatabulation(frequency table vi) Relative frequency table. b Grouped data vii) Bar graph viii) Pie chart ix) Line graph x) Frequency polygon xi) Frequency curve xii) Relative frequency polygon xiii) Histograms xiv) Box plot xv) Leaf-stem plot To be done in Microsoft excel.	8-0-16

	sheet. ➢ Sketches frequency curve and frequency polygon for the data set on Microsoft Excel spread sheet.		
UNIT-3 **MEASURE OF LOCATION AND DISPERSION**	➢ Able to determine the descriptive statistical variables using Microsoft Excel. ➢ Able to determine the absolute measures of dispersion of the given data set. ➢ Explain the symmetry and asymmetry of the distributed data.	a Determination of central tendencies Range, Mean, Mode and Median for the data in Microsoft excel. b Determination of absolute measures of dispersion for data like range quartile deviation, mean deviation, standard deviation and variance in Microsoft Excel. c Skewness and kurtosis graphs in Microsoft excel and interpretations of results.	6-0-12
UNIT-4 **INTRODUCTION TO PYTHON PROGRAMMING**	➢ Able Install and run the Python interpreter. Create and execute Python programs. ➢ Understand the concepts of file I/O. ➢ Able to read data from a text file using Python. ➢ Learn variable declarations in Python. ➢ Learn control structures. ➢ Learn loop constructs.	4.1 Introduction to PYTHON. 4.2 Syntax of PYTHON. 4.3 Comments of PYTHON. 4.4 Data types of PYTHON. 4.5 Variables of PYTHON. 4.6 If-else in PYTHON. 4.6 Loops in PYTHON. 4.7 Arrays and functions in PYTHON.	8-0-16

SL NO	Practical outcomes/Practical exercises	Unit no	PO	CO	L:T:P
1	Prepare a questionnaire (closed end) containing 25 questions for a specified problem statement: for example experience of an individual in a restaurant.	1	1,2,4,5,7	1	0:0:2
2	Prepare a Google form for a specified problem statement to collect the dataset. (for example questionnaire to conduct online quiz)	1	1,2,4,5,7	1	0:0:2
3	Send out a survey on your problem statement to number of 50 (By Google forms) and collect the data.	1	1,2,4,5,7	1	0:0:2
4	Remove duplicate or irrelevant observations. Remove unwanted observations from the dataset provided, including duplicate observations or irrelevant observations.	1	1,2,4,5,7	1	0:0:2
5	In Microsoft Excel spread sheet draw the frequency distribution table for the given data (data set should contain minimum 50 data).	2	1,2,4,5,7	2	0:0:2
6	In Microsoft Excel spread sheet draw the relative frequency distribution table for the given data (data set should contain minimum 50 data).	2	1,2,4,5,7	2	0:0:2
7	Using Microsoft Excel spread sheet plot bar graph for the data collected from 100 people(for example, conduct a survey on the favorite fruit of a person in your locality(restricting to 5 to 6 fruits). Explain the bar graph with minimum 30 words.	2	1,2,4,5,7	2	0:0:2
8	Using Microsoft Excel spread sheet plot pie chart for the data collected from 50 people(for example, conduct a survey on the smokers with respect to their ages in your locality. Explain the pie chart with minimum 30 words.	2	1,2,4,5,7	2	0:0:2
9	Using Microsoft Excel spread sheet draw a line graph for the given dataset.	2	1,2,4,5,7	2	0:0:2
10	Using Microsoft Excel spread sheet draw frequency polygon and frequency curve for the data collected from 50 people. (For example, marks obtained by the students in your class in 5 subjects in previous examination). Explain your observations from the graph in minimum 30 words.	2	1,2,4,5,7	2	0:0:2
11	Using Microsoft Excel spread sheet construct a box plot for the given dataset. (For example dataset can be the number of passengers in a flat form at different time in a day).	2	1,2,4,5,7	2	0:0:2
12	Using Microsoft Excel spread sheet construct a leaf plot for the given dataset. Explain the graph with minimum 30 words.	2	1,2,4,5,7	2	0:0:2

13	Using Microsoft Excel spread sheet find the Mean, Mode and Median for the data (univariate data) given and also represent them in a Histogram.	3	1,2,4,5,7	2	0:0:2
14	Generate a 50 random data sample (even and odd number dataset) using Microsoft Excel spread sheet and determine the range and Quartiles.	3	1,2,4,5,7	2	0:0:2
15	Collect the current yield of a crop from 50 different persons (problem statement can be changed according to priorities of the tutor) in your locality and determine mean deviation and Quartile deviation in Microsoft excel spread sheet and brief your inference with less than 30 words.	3	1,2,4,5,7	3	0:0:2
16	Collect the data of any 2 livestock population from 50 different houses in your locality (problem statement can be changed according to priorities of the tutor) and determine standard deviation for both the two separately in Microsoft excel spread sheet and brief your inference with less than 30 words.	3	1,2,4,5,7	3	0:0:2
17	Collect the data of two wheeler (with a rider and a pillion) crossing a busy junction in your locality in the peak hours (problem statement can be changed according to priorities of the tutor) and determine the variance of the data in Microsoft excel spread sheet and brief your inference with less than 30 words.	3	1,2,4,5,7	3	0:0:2
18	Using Microsoft Excel spread sheet draw a Skewness graph and kurtosis graph for randomly generated dataset.	3	1,2,4,5,7	3	0:0:2
20	Write a python program to add 2 integers and 2 strings and print the result.	4	1,2,4,5,7	4	0:0:2
21	Write a python program to find the sum of first 10 natural numbers.	4	1,2,4,5,7	4	0:0:2
22	Write a python program to find whether the number is odd or even.	4	1,2,4,5,7	4	0:0:2
23	Write a python program to find the variance and standard deviation for the given data..	4	1,2,4,5,7	4	0:0:2
24	Write a python program to display student marks from the record.	4	1,2,4,5,7	4	0:0:2
25	Write a python program to create a labeled bar graph using matpoltlib. pyplot.	4	1,2,4,5,7	4	0:0:2
26	Write a python program to create a labeled pie chart using matpoltlib. pyplot.	4	1,2,4,5,7	4	0:0:2
Total Hours					**0:0:52=52**

MAPPING OF CO WITH PO

CO	Course Outcome	PO Mapped	Experiment Linked	Cognitive Level **R/U/A**	Tutorial & Practical Sessions in Hrs.	**TOTAL**
CO1	Understand the tools of data collection, classification and cleaning of data.	1,2,4,5,7	1-4	A	12	12
CO2	Able to summarize the given statistical data	1,2,4,5,7	5-12	A	33	33
CO3	Understand the measure of location and dispersion of data.	1,2,4,5,7	13-18	A	12	12
CO4	Learn the basics of Python programming.	1,2,4,5,7	19-26	A	21	21
					78	**78**

Course	CO's	Programme Outcomes (PO's)						
		1	2	3	4	5	6	7
Statistics & Analytics	CO1	3	3	0	3	3	0	3
	CO2	3	3	0	3	3	0	3
	CO3	3	3	0	3	3	0	3
	CO4	3	3	0	3	3	0	3

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

SUGGESTED LEARNING RESOURCES:

1. Statistical Analysis with Excel For Dummies (For Dummies Series) Paperback – Import, 9 April 2013 by Joseph Schmuller (Author)
2. https://www.brianheinold.net/python/A_Practical_Introduction_to_Python_ProgrammingHeinold.pdf
3. http://www.bikeprof.com/uploads/9/0/6/5/9065192/excel_stats_handout_npl.pdf
4. https://adminfinance.umw.edu/tess/files/2013/06/Excel-Manual1.pdf
5. https://www.brianheinold.net/python/A_Practical_Introduction_to_Python_ProgrammingHeinold.pdf
6. Introduction to Python programming for beginners by Vivian Baily Kindle edition.
7. PYTHON PROGRAMMING: Python programming: the ultimate guide from a beginner to expert by Clive Campbell.
8. Open source for python: https://hub.gke2.mybinder.org/user/jupyterlab-jupyterlab-demo-zfkdwy4y/lab

SUGGESTED LIST OF STUDENT ACTIVITY

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

1	Describe the data collection activity itself (interviews, surveys, library research, etc.) AND why this specific form of data collection was chosen. Be sure to explain why you think this kind of data will help you in your design process. Also be sure to provide details about the activity: how many interviews, how long they took, where they took place, how many questions asked in a survey, how many respondents, etc. Present the results of your data collection. You do not have to have completely analyzed all your data, but do make sure you present the results of your research. If you did a survey, please attach a copy of the survey as an appendix; if you did interviews, please attach a copy of the interview questions. Discuss any preliminary analysis of your data. What have you learned thus far from the data should be discussed from an analytical perspective (rather than a data dump). For example, if you surveyed people about their use of the local bus system, and 90% of your respondents said they take the bus when it is raining, and 60% of your respondents said they usually wait more than 10 minutes for a bus, think about what this teaches you rather than just the information itself. In this instance, you can see that people are generally waiting for several minutes in the rain for a bus, so a covered bus stop might be a good idea. Keep in mind that your findings from data should lead directly to the conclusions you make about your design recommendations. This is the time to begin thinking very specifically about your research in those terms. This is also an opportunity to think about your definition of "better" and how it applies to your design goals and your choice of research activities (for example, if you are choosing to make something better by making it cheaper, maybe you are interviewing people to see how much loss of functionality or decrease in features for a technology they are willing to tolerate).

2	https://ils.unc.edu/courses/2013_spring/inls541_001/Assignments.html#Assignment_9 DOWNLOAD a dataset from the above link and use data visualization tools to analyze it.
3	Acquire the dataset from https://www.kaggle.com/datasets (For example acquire the data of IPL ball by ball scores and find the standard deviation and variance of score of a batsmen)and clean the data for the root cause of the problem statement and summarize the date and explain the inference.

COURSE ASSESSMENT AND EVALUATION CHART

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	Models	Students	Two IA Tests (Written)	20	Blue Book	1,2,3.
				Three Skill tests	20	Model	1,2,3
				Student Activity	20	Model/Report	
				TOTAL	60		
	SEE (Semester End Examination)	End Exam		End of the course	100	Models	1,2,3
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3, Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3 Effectiveness of Demonstrations& Assessment Methods

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
2	CIE Assessment 2 (Written Test -2-theory) - At the end of **13th week**	60 minutes	20	
3	CIE Assessment 3 (Skill test) - At the end of **5th week**	3 Hrs	20	Average of three skill tests 20
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**	3Hrs	20	
6	CIE Assessment 6 (Student activity) - At the end of **11th week**	-	20	20
7	Total Continuous Internal Evaluation (CIE) Assessment			60
8	Semester End Examination (SEE) Assessment (Practical Test)	3Hrs	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.
3. SEE is conducted for 100 Marks (3 Hours duration) as per scheme of evaluation.

MODEL QUESTION PAPER

CIE, SKILL TEST AND SEMESTER END EXAMINATION

Course & Programme: Common to all Engineering Programmes.	**Semester:** II
Subject: Statistics and Analytics Practice	**Max Marks:** 100
Course Code : 20SC21P	**Duration :** 3Hrs

Instruction to the Candidate: Answer both questions

Qn.No	Question	CL	CO	PO	Marks
1	For the given ungrouped data set plot the bar graph by grouping the data in Microsoft excel spread sheet and interpret the obtained results. (Dataset. bar graphs and interpretation have to be entered in the answer script). OR Generate a random data set in Microsoft excel spread sheet containing 50 data and find the mean mode and median in Microsoft excel spread sheet and interpret the obtained results. (Dataset, bar graphs and interpretation have to be entered in the answer script).	A	2,3	1,2,4,5,7	50
2	Write the python program to enter two integers and two strings and to print the sum two integers and two strings.	A	4	1,2,4,5,7	50

Questions are not framed from Unit 1 in the final SEE. Short questions can only be asked from that unit.

SCHEME OF EVALUATION FOR BOTH CIE AND SEE

Sl. No	Particulars	Marks
1	Short questions from Unit 1	10
2	Observation	30
3	Conduction	20

4	Output and Interpretation of result	20
5	Viva-voce	20
Total		100

EQUIPMENT LIST

FOR STATISTICS AND DATA ANALYTICS LAB

2 laboratories. Each containing 30 computers (Desktop) with the following system requirements.

SYSTEM REQUIREMENTS			
SL NO	REQUIREMENTS	MINIMUM	RECOMMENDED
1	RAM	4GB FOR FREE RAM	8GB OF TOTAL SYSTEM RAM
2	DISK SPACE	2.5 GB AND 1 GB FOR CACHES	SSD DRIVE WITH AT LEAST 5 GB OF FREE SPACE
3	MONITOR RESOLUTION	1024x768	1920×1080
4	OS(OPERATING SYSTEM)	OFFICIALLY RELEASED 64-BIT VERSIONS OF THE FOLLOWING: MICROSOFT WINDOWS 8 OR LATER	LATEST 64-BIT VERSION OF WINDOWS

Government of Karnataka

Department of Collegiate and Technical Education

Board of Technical Examinations, Bangalore

Course Code	20CS01P	**Semester**	I/II
Course Title	**IT SKILLS**	**Course Group**	ES/CS
No. of Credits	4	**Type of Course**	Lecture + Practice
Course Category	ES	**Total Contact Hours**	6Hrs Per Week 78Hrs Per Semester
Prerequisites	Basic Computer Skills	**Teaching Scheme**	(L:T:P)= 1:0:2
CIE Marks	60	**SEE Marks**	40

1. RATIONALE

Information Technology is crucial to the majority of the business and has a great influence on innovation and engineering. Every branch of engineering and every organization opt for computers and IT skills for business automation, communication/connectivity, resource planning, work automation and securing information etc. All engineering diploma students must be conversant with the basic IT skills which empower them to learn new technologies, adapt to changes, business development, communication etc.

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.

Perform jobs related to web design and maintenance, business process automation tool management, cyber security and safety and program assistant.

3. COURSE OBJECTIVES

1. Demonstrate the basics of coding.
2. Design and develop web pages that include static and dynamic content.
3. Describe the basic concepts of Cloud and IoT.
4. Express the workflow and business automation
5. Recognize the best practices of Cyber Safety and security.

4. JOB ROLE

SL.NO	LEVEL	JOB ROLES
1	3	Junior software developer - web.
2	3	Junior Creative Designer/Digital Artist

5. PREREQUISITES

STUDENT	Basic Computer skills (Students without basic computer skills should be taught basic skills)
TEACHER	Computer science faculty with required knowledge of IT Skills.

6. COURSE OUT COMES

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

COURSE OUTCOME		UNIT LINKED	CL	LINKED PO	TEACHING HOURS
CO1	Illustrate the basics of coding and develop simple applications for android phones.	1	U, A	1,4,7	15
CO2	Design and Develop websites.	2	U, A	1,4,7	30
CO3	Identify Cloud Services IoT applications	3	U	1,4,7	12
CO4	Apply workflow and use ERP for a simple project plan	4	U	1,4,7	09
CO5	Implement best practices of cyber safety and security in the workplace.	5	U, A	1,4,7	12
	TOTAL				**78**

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

8. INSTRUCTIONAL STRATERGY

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

1. Lecturer method(L) does not mean only traditional lecture method, but different type of teaching method and media visual/graphical content that are employed to develop the outcomes
2. Massive Open on-line courses (MOOCS) can be used to teach various topics/sub topics.
3. Online coding platform wherever mentioned.
4. Hands on coding should be practiced.
5. About 15 to 20% of the topics/sub topics which are relatively simpler or descriptive in nature is to be given to the students for self-directed learning

9. DETAILS OF 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

UNIT NO	Topics/Sub topics	Unit skill set/Learning outcomes (In cognitive domain)	Hours L-T-P
1	**UNIT 1 - INTRODUCTION TO BASICS OF CODING**		05-0-10
	1.1 Introduction to computer programming 1.2 Algorithms –With sufficient examples 1.3 Flowcharts – With sufficient examples 1.4 Execute simple programs **Note: Below listed or any other suitable online/offline coding platforms should be used to demonstrate and provide coding experience to students.** **a. https://scratch.mit.edu/**	1. Understand computer programming 2. Create and write Algorithm for programmable problems. 3. Design Flowchart for programmable problems. 4. Develop simple Android application.	

	b. https://studio.code.org/projects Suggested programs are listed in Table 1 1.5 Introduction to Application development 1.6 Simple android application development (No knowledge of programming language is required). **Note:** ***i. The purpose of application development is to ignite and promote programming skills.*** ***ii. Application development should be done using any App builder platforms such as*** ***iii. MITApp Inventor: https://appinventor.mit.edu/*** ***iv. Thunkable: https://thunkable.com/*** ***v. ibuildapp: https://ibuildapp.com/*** ***vi. The student should be introduced to the android application development environment for further research and learninghttps://developer.android.com/*** 1.7 Activity: create a simple Android application (Unique for each student) publish on the learning management system.		
2	**UNIT 2 - DESIGN AND DEVELOP WEB PAGES**		10-0-20
2	2.1 Basic web technologies ▪ Browser ▪ Web –Server ▪ Client-Server Model ▪ URL ▪ SEO techniques ▪ Domain names and domain name system. 2.2 Creating Web-pages with HTML5 - Static	1. Understand and examine basic web technologies 2. Creating static web pages 3. Formatting Webpages with cascading style sheets (CSS) 4. Creating Dynamic web pages with JavaScript	

	web pages. ▪ Introduction, Editors ▪ Tags, Attributes, Elements, Headings ▪ Links, Images, List, Tables, Forms ▪ Formatting, Layout, Iframes. 2.3 Formatting web pages with style sheets (CSS3). ▪ Introduction to CSS ▪ Inline CSS, Internal CSS, Classes and IDs ▪ div, Color, Floating, Positioning ▪ Margins, Padding, Borders ▪ Fonts, Aligning Text, Styling Links 2.4 Creating a web page dynamic using JavaScript. ▪ Dynamic web page and Introduction to JS ▪ Basic syntax ▪ Functions ▪ Events Note: Refer https://www.w3schools.com **2.6** Creating dashboards in websites. **2.6 Activity: Personal website design and launch with a free platform or Create a Blogging website.** ▪ **Online platforms (Learning and executing)** ▪ **https://www.w3schools.com/** ▪ **https://studio.code.org** ▪ **https://www.khanacademy.org** **Note:** **1) The student must be introduced to website development platforms - worldpress.com.** **2) The student must be made familiar**	5. Creating and launching dashboard based personal website.	

	with launching websites . Certification available: • HTML - W3schools • CSS - W3schools • JavaScript - W3schools		
3	**UNIT 3 -BUSINESS PROCESS AUTOMATION/ERP**		03:0:06
3	3.1 Introduction to business process automation. 3.2 Organization structure and functions composition-Properties and applications ▪ Structure ▪ Types ▪ Functional Units **Note: Students should be made familiar with organization, types and components of a big enterprise to make him understand the working of organization keeping him as part of org.** 3.3 Workflows ▪ Introduction ▪ Components ▪ Use and use cases **Note: Use free and open-source platform to demonstrate and create workflows.** **Example:** **https://airflow.apache.org/** **https://taverna.incubator.apache.org/** **https://trello.com/** **https://www.processmaker.com/** 3.4 Enterprise resource planning ▪ History ▪ Evolution ▪ Uses of ERP ▪ ERP software tools.	1. Identify and examine the needs of business process automation. 2. Understand Organization structure and functions 3. Create and use workflows 4. Use Enterprise resource planning in workplace.	

	Note: The student should be introduced into Enterprise resource planning software tools to understand importance of ERP. **Examples:** ▪ **https://erpnext.com/** ▪ **www.bitrix24.com** ▪ **https://www.odoo.com/** **3.5 Activity:** ▪ **Project plan for summer internship - use open source ERP Software** ▪ **Identify different components of nearby organization with recourse plan and workflow design.** ▪ **Identify types of ERP software available with their market share.**		
4	**UNIT 4 - INTRODUCTION TO CLOUD AND IOT CONCEPTS**		04-0-8
	4.1 Fundamentals of cloud 4.2 Cloud service models ▪ IaaS (Infrastructure-as-a-Service) ▪ PaaS (Platform-as-a-Service) ▪ SaaS (Software-as-a-Service) 4.3 Cloud deployment types ▪ Public, ▪ Private, ▪ Hybrid ▪ Community Cloud 4.4 Cloud services: ▪ Google Drive - file storage and synchronization service developed by Google; ▪ Google docs- bring your documents to life with smart editing and styling tools to help you easily format text and paragraphs; ▪ Google Co-lab (Usage of Jupyter Notebook): *Colab* notebooks allow you to combine	1. Understand Cloud concepts 2. Identify and use Cloud services 3. UnderstandIoT concepts 4. Identify IoT applications	

	executable code and rich text in a single document, along with images, HTML, LaTeX, and more. ▪ Google App Engine: Google App Engine is a Platform as a Service and cloud computing platform for developing and hosting web applications in Google-managed data centers. Applications are sandboxed and run across multiple servers. **Note: Above cloud services are not compulsory for all branches; teacher can recommend other cloud service based on need of engineering branch.** 4.5 Working of IoT and IoT components (Only brief introduction and demonstration through videos) 4.6 Explain concept of Internet of Things with examples ▪ Smart home ▪ Smart city ▪ Smart farming **Note:** **a. Teacher can also select specific area of work where Things (autonomous computing devices) could be interconnected over TCP/IP to establish IoT.** b. **The students should be introduced to the IoT environment for further research and study**. **Example:** ▪ **https://www.raspberrypi.org/** ▪ **https://www.arduino.cc/**		

	4.7 Activity: **Create your cloud service account and demonstrate using cloud services.** **Identify cloud service provider with respect to service models and deployment types.** **Identify areas where Internet of Things could bring positive changes.**		
5	**UNIT 5 - CYBERSECURITY AND SAFETY**		**4-0-8**
	5.1 Introduction to Cyber security and cyber safety. ▪ Brief awareness on cyber safety measures ▪ Identification of basic security issues in mobile phones and personal computers ▪ Installation of Antivirus software ▪ Firewall concepts ▪ Browser settings ▪ Importance of privacy and Password policy (Best practices). 5.2 Common threats - Demonstration ▪ Phishing ▪ DoS attack ▪ Man in the middle attack ▪ Eavesdropping ▪ Spamming **5.3 Activity** ▪ **Identification of basic security issues in computers of your college and fixing the same.** ▪ **Visit nearby government organization.** ▪ **Identify basic cybersecurity issues and fixing the same** ▪ **Demonstrate the importance of cybersecurity, password policy, and cyber safety.**	1. Identify need for Cyber security and cyber safety 2. Identify basic security issues in mobile phones and personal computers 3. Examine Importance of privacy, Password policy 4. Implement best practices of cyber safety and security in work place	

10. SUGGESTED PRACTICAL SKILL EXERCISES

TABLE-I

Sl. No.	Practical Out Comes/Practical exercises	Unit No.	PO	CO
1	Write an algorithm for programmable problems Example for Reference: • Add/subtract two numbers • Find the largest/smallest of 3 numbers • Calculate and print sum of 'N' numbers	1	1,4,7	1
2	Design a flowchart for programmable problems Example for Reference: Add/subtract two numbers Find the largest/smallest of 3 numbers Calculate and print sum of 'N' numbers	1	1,4,7	1
3	Design and create simple game using MIT-scratch/Code.org	1	1,4,7	1
4	Design and create simple android application (MIT App Inventor)	1	1,4,7	1
5	Design and create webpage for displaying your poem (Title, header, paragraph, formatting tags)	2	1,4,7	2
6	Design and create webpage for your wish list (What you want to do). Also list challenges and opportunities along with images to present your dreams (List ordered and unordered, Image, table)	2	1,4,7	2
7	Design and create webpage using HTML and CSS about an awesome animal (Use necessary CSS tags)	2	1,4,7	2
8	Design and create web page for a travel book/recipe book with more than 3 pages, table to list places/recipes (iframe, hyperlink)	2	1,47	2
9	Design and create web page with JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient	2	1,4,7	2
10	Design and create a personal webpage with dashboard	2	1,4,7	2
11	Design and create web page about advantages of business process automation with respect to your branch of engineering	2,3	1,4,7	2,3

12	Create a workflow for education loan approval in bank/diploma admission process (Use any tool)	3	1,4,7	3
13	Demonstrate ERP with ERPNext Demo for manufacturing, retail and service sector (Use any other ERP tools)	3	1,4,7	3
14	Create user account and demonstrate use of Google drive, Google docs, Google Co-lab (Usage of Jupyter Notebook)	4	1,4,7	4
15	1.1 Demonstrate Internet of Things using with examples a. Smart home b. Smart city c. Smart farming Note: Teacher can also select specific area of work where Things (autonomous computing devices) could be interconnected over TCP/IP to establish IoT.	4	1,4,7	4
16	Installation of Antivirus software	5	1,4,7	5
17	Demonstration and hands on browser settings	5	1,4,7	5
18	Demonstration and hands on privacy settings and password policy	5	1,4,7	5
19	Demonstration of common security threats (using videos) a. Phishing b. DoS attack c. Man in the middle attack d. Spamming e. Virus	5	1,4,7	5

The suggested practical activities (TABLE-I) in this section are demonstrated for the attainment of the competency. These practical activities can also be used for the student assessment in portfolio mode for awarding CIE marks. **The lecturer can enhance the competency level of the students by sketching more practical exercises.**

NOTES:

1. It is compulsory to prepare log book/record of exercises. It is also required to get each exercise recorded in logbook, checked and duly dated signed by the teacher
2. Student activities are compulsory and are also required to be performed and noted in logbook.
3. Student activity is compulsory and part of skill assessment. The activity enable student to explore the course, help student to demonstrate creativity & critical thinking.
4. Student activity report is compulsory part to be submitted at the time of practical ESE
5. Term work report is compulsory part to be submitted at the time of practical ESE.

6. Student activity and student activity reports must be uploaded to Learning management system.
7. For CIE, students are to be assessed for Skills/competencies achieved.

11. MAPPING OF CO WITH PO

COURSE	CO'S	PROGRAMME OUTCOMES (PO'S)						
		1	2	3	4	5	6	7
IT SKILLS	CO1	3	0	0	3	0	0	3
	CO2	3	0	0	3	0	0	3
	CO3	3	0	0	3	0	0	0
	CO4	3	0	0	3	0	0	3
	CO5	3	0	0	3	0	0	0
Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped								

12 SUGGESTED LEARNING RESOURCES

	BOOKS
1	The Art of Programming Through Flowcharts & Algorithms, A. B. Chaudhuri, Firewall Media publication
2	HTML5 Black Book, by Publishing company Limited. Kogent Learning Solutions Inc.
3	"World Wide Web design with HTML", Xavier, Tata McGraw-Hill
4	Internet of Things – A Hands on Approach, By ArshdeepBahga and Vijay Madisetti Universities Press, ISBN: 9788173719547
	URL'S
1	https://scratch.mit.edu
2	https://studio.code.org
3	http://ai2.appinventor.mit.edu
4	https://www.w3schools.com
5	https://www.tutorialspoint.com/javascript/index.htm
6	https://www.geeksforgeeks.org/html-tutorials/
7	Android https://developer.android.com
8	https://www.khanacademy.org
9	Tools for Web Development a. https://www.wix.com

	b. https://atom.io/ c. https://www.openelement.com/ d. https://www.layoutit.com

13. SUGGESTED LIST OF PROPOSED STUDENTS ACTIVITY

Note: Refer activities mentioned in DETAILS OF COURSE CONTENT table

14. COURSE ASSESSMENT AND EVALUATION CHART

SL.NO	ASSESSMENT	DURATION (in minutes)	MAX MARKS	CONVERSION
1	CIE Assessment 1 (Written Test -1 TH) - At the end of 3 d week	**60**	**20**	Average of two written tests 20
2	CIE Assessment 2 (Written Test -2 TH) - At the end of 13 week	**60**	**20**	
3	CIE Assessment 3 (Skill Test) - At the end of 5 week	**3 hrs**	**20**	Average of three skill test 20
4	CIE Assessment 4 (Skill Test) - At the end of 7 week	**3 hrs**	**20**	
5	CIE Assessment 5 (Skill Test) - At the end of 9 week	**3 hrs**	**20**	
6	CIE Assessment 6 (Student activity)- At the end of 11 week	**-**	**20**	**20**
7	**Total Continuous Internal Evaluation (CIE) Assessment**			**60**
8	Semester End Examination(SEE) Assessment (Practical Test)	**3 hrs**	**100**	**40**
TOAL MARKS				**100**
Note: 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 from each section.				

15. RUBRICS FOR ACTIVITY

RUBRICS FOR ACTIVITY (Example Only) Appropriate rubrics shall be developed by the concerned faculty						
Dimension	**Poor**	**Below Average**	**Average**	**Good**	**Exemplary**	**Student Score**
	4	**8**	**12**	**16**	**20**	
Concept	Does not collect any information relating to the concept	Collects very limited information; some relate to the concept	Collect much information; but very limited relate to the concept	Collects some basic information; most refer to the concept	Collects a great deal of information; all refer to the concept	8
Design	Design is not acceptable/very poorly structured	Design is poor and not well structured.	Design Fallowed layout samples and well structured	Design & convey both content and context	Design considered all aspect of concept, concept and presentation (UI)	6
Creativity	Very little creativity in design/implementation	Creativity in concept or design or implementation	Creativity in concept /design/implementation	Creativity in concept /design/implementation which complements each other	Creative concept, content, presentation and implementation	8
Implementation	Poorly implemented	Partially implemented	Implemented on time with results (content)	Product convey both content and context	Product is creative with easy-to-use UI, structure	8
					Average / Total Marks: (8+6+8+8)/4	**7.5 = 8**

16. RUBRICS for Skill Test Evaluation (Both for CIE & SEE)

Sl No	Parameter to be Observed	Marks Allotted
1	Design-Written Skill Test 1: Algorithm / Flowchart/Visual Design Skill Test 2: Web site visual design Skill Test 3: Work flow or Project plan or cyber security plan or Cloud service Concept	30
2	Implementation Skill Test 1: Android application Skill Test 2: Web site / Web pages Skill Test 3: Create or use cloud service account or Cyber safety and security- Antivirus Installation or browser settings	50
3	Appeal and Presentation	20
Total		**100**

17. SYSTEM REQUIREMENTS:

Sl. No.	Specification	Quantity
1.	Computers with HD Graphics Card	20
2.	Software: GIMP, KRETA, BLENDER, PHOTOSHOP or any other relevant open-source software.	-
3.	Internet Connectivity	-

Note: Above specification is for a batch of 20 students

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

Course Code	20AU01T	**Semester**	I
Course Title	**ENVIRONMENTAL SUSTAINABILITY**	**Course Group**	Audit
No. of Credits	2	**Type of Course**	Lecture
Course Category	AU	**Total Contact Hours**	2Hrs Per Week
			26Hrs Per Semester
Prerequisites	Basic Environmental Science	**Teaching Scheme**	(L:T:P)= 2:0:0
CIE Marks	50	**SEE Marks**	No

COURSE OBJECTIVES:

Technicians working in industries or elsewhere essentially require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.

1. Solve various engineering problems applying ecosystem to produce eco – friendly products.
2. Use relevant air and noise control methods to solve domestic and industrial problems.
3. Use relevant water and soil control methods to solve domestic and industrial problems.
4. To recognize relevant energy sources required for domestic and industrial applications.
5. Solve local solid and e-waste problems.

COURSE OUTCOMES:

At the end of the course student will be able to know :

CO1	Importance of ecosystem and terminology.
CO2	The extent of air pollution, effects, control measures and acts.
CO3	The extent of noise pollution, effects, control measures and acts.
CO4	The water and soil pollution, effects, control measures and acts
CO5	Different renewable energy resources and efficient process of harvesting.
CO6	Solid Waste Management and Environmental acts.

COURSE CONTENT:

Marks: 15	***Unit-1 Ecosystem***	*Allotted Hrs: 03*
Structure of ecosystem, Biotic & Abiotic components, Aquatic (Lentic and Lotic) and terrestrial ecosystem. Global warming - Causes, effects, Green House Effect, Ozone depletion.		
Marks: 20	***Unit-2Air Pollution***	*Allotted Hrs: 03*
Air pollution, Natural and manmade sources of air pollution, Effects of air pollution.Air Pollutants and Types. Control of air pollutants by Cyclone separator and Electrostatic Precipitator, Air (prevention and control of pollution) act 1981		
Marks: 10	***Unit-3 Noise Pollution:***	*Allotted Hrs: 02*
Noise pollution: sources of pollution, measurement of pollution level, Effects and Control of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000		
Marks: 20	***Unit- 4Water and Soil Pollution:***	*Allotted Hrs: 06*
Water pollution and Sources of water pollution, Types of water pollutants, Characteristics of water pollutants,control measures of water pollution. Definition and list unit operations in water and WasteWater Treatment process,Water (prevention and control of pollution) act 1974, Water conservation – Importance of Rain Water Harvesting. Soil pollution, Causes, Effects and Preventive measures of Soil Pollution due to Excessive use of Fertilizers, Pesticides and Insecticides		
Marks: 20	***Unit-5 Renewable sources of Energy***	*Allotted Hrs: 07*
Solar Energy: Basics of Solar energy. Definition and advantages of advanced solar collectors. Solar water heater and Solar stills and their uses. *Biomass:* Overview of biomass as energy source. Thermal characteristics of biomass as fuel. *Wind energy:* Current status and future prospects of wind energy. Wind energy in India. Need of new Energy sources, Different type's new energy sources. Environmental benefits of New Energy Sources-Hydrogen energy, Ocean energy resources, Tidal energy conversion.		
Marks: 15	***Unit-6 Solid Waste Management and Environmental Acts***	*Allotted Hrs: 05*
Solid waste generation, Sources and characteristics of Municipal solid waste, Solid Waste Management rules 2016- 3R in SWM. E- Waste generation, Sources and characteristics, E waste management rules 2016 Plastic Waste generation, Sources and characteristics, Recycled plastic rules 2016 Importance of Environment (protection) act 1986 Occupational health and safety measures.		

Unit No & Name	Detailed Course Content	CO	PO	Contact Hrs
1. Ecosystem	Structure of ecosystem, Biotic & Abiotic components, Aquatic (Lentic and Lotic) and terrestrial ecosystem.	CO1	1,5,7	1
	Global warming - Causes, effects.	CO1	1,5,7	2
	Green House Effect, Ozone depletion - Causes, effects	CO1	1,5,7	3
2. Air and Pollution	Air pollution, Natural sources of air pollution, Man Made sources of air pollution	CO2	1,5,7	4
	Air pollutants and Types, Effects of Particulate Pollutants and control by Cyclone separator	CO2	1,5,7	5
	Effects of Particulate Pollutants and control by Electrostatic Precipitator, Air (prevention and control of pollution) act 1981.	CO2	1,5,7	6
3. Water and Soil Pollution	Noise pollution: sources of pollution, Measurement of Noise pollution level.	CO3	1,5,7	7
	Effects and Control of Noise pollution. Noise pollution (Regulation and Control) Rules, 2000	CO3	1,5,7	8

4. Water and Soil Pollution:	Sources of water pollution. Types of water pollutants, Characteristics of water pollutants.	CO4	1,5,7	9
	Control measures of water pollution.	CO4	1,5,7	10
	Definition and list unit operations in water and WasteWater Treatment process, Water (prevention and control of pollution) act 1974.	CO4	1,5,7	11
	Water conservation – Importance of Rain Water Harvesting	CO4	1,5,7	12
	Soil pollution, Causes and Effects due to Fertilizers, Pesticides and Insecticides	CO4	1,5,7	13
	Preventive measures of Soil Pollution due to Excessive use of Fertilizers, Pesticides and Insecticides.	CO4	1,5,7	14
5. Renewable sources of Energy	Solar Energy: Basics of Solar energy. Solar collectors and advantages of Advanced solar collectors.	CO5	1,5,7	15
	Solar water heater, Solar stills and their uses.	CO5	1,5,7	16
	Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel.			17
	Wind energy: Current status and future prospects of wind energy. Wind energy in India.	CO5	1,5,7	18
	Need of new Energy sources, Different type's new energy sources. Environmental benefits of New Energy Sources-Hydrogen energy	CO5	1,5,7	19
	Environmental benefits of New Energy Sources- Ocean energy resources	CO5	1,5,7	20
	Environmental benefits of New Energy Sources-Tidal energy conversion.	CO5	1,5,7	21
6. Solid Waste Management And Environmental Acts	Solid waste generation, Sources, Characteristics of solid waste Solid Waste Management rules 2016	CO6	1,5,7	22
	E- Waste generation Sources and characteristics, E waste management rules 2016	CO6	1,5,7	23
	Plastic Waste generation Sources and characteristics, Plastic Waste Sources and characteristics	CO6	1,5,7	24
	Recycled plastic rules 2016,Importance of Environment (protection) act 1986,	CO6	1,5,7	25
	Occupational health and safety measures.	CO6	1,5,7	26
			Total	**26**

References:

(a) Suggested Learning Resources:

Books:

1. S.C. Sharma & M.P. Poonia, Environmental Studies,Khanna Publishing House,NewDelhi
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099.
4. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
5. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi

6. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
1. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07- 451871-8.
2. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.
7. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.
3. Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6
4. Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.
5. Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)

(b) Open source software and website address:

1) www.eco-prayer.org
2) www.teriin.org
3) www.cpcp.nic.in
4) www.cpcp.gov.in
5) www.indiaenvironmentportal.org.in
6) www.whatis.techtarget.com
7) www.sustainabledevelopment.un.org
8) www.conserve-energy-future.com

Teachers should use the following strategies to achieve the various outcomes of the course.

• Different methods of teaching and media to be used to attain classroom attention.
• Massive open online courses (MOOCs) may be used to teach various topics/subtopics.
• 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
• Micro-projects may be given to group of students for hand-on experiences
• Encouraging students to visit sites such as Railway station and research establishment around the institution.

Mapping of Course Outcomes with Programme Outcomes

CO	Course Outcome	PO Mapped	Cognitive Level R/U/A	Theory Sessions In Hrs	Allotted marks for CIE on cognitive levels		TOTAL
					R	U	
CO1	Importance Of ecosystem and terminology	1,5,7	R,U	03	02	02	04
CO2	The extent of air pollution, effects, control measures and acts.	1,5,7	R,U	03	03	02	05
CO3	The extent of noise pollution, effects, control measures and acts.	1,5,7	R,U	02	03	02	05
CO4	The water and soil pollution, effects, control measures and acts	1,5,7	R,U	06	03	02	05

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)					

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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 1.2 Algebra of Matrices (addition, subtraction, scalar multiplication and multiplication) 1.3 Evaluation of determinants of a square matrix of order 2 and 3. Singular matrices 1.4 Cramer's rule for solving system of linear equations involving 2 and 3 variables 1.5 Adjoint and Inverse of the non-singular matrices of order 2 and 3 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 ➢ Determine whether the lines are parallel or perpendicular	2.1 Slope of a straight line 2.2 Intercepts of a straight line 2.3 Intercept form of a straight line 2.4 Slope-intercept form of a straight line 2.5 Slope-point form of a straight line 2.6 Two-point form of a straight line 2.7 General form of a straight line 2.8 Angle between two lines and conditions for lines to be parallel and perpendicular 2.9 Equation of a straight line parallel to the given line 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 ➢ Able to find all the measurable dimensions of a triangle	3.1 Concept of angles, their measurement, Radian measure and related conversions. 3.2 Signs of trigonometric ratios in different quadrants (ASTC rule) 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 $360^0 \pm \Theta$) 3.4 Trigonometric ratios of compound angles (without proof) 3.5 Trigonometric ratios of multiple angles 3.6 Transformation formulae	10-0-0
UNIT-4 DIFFERENTIAL CALCULUS AND APPLICATIONS	➢ Able to differentiate algebraic, exponential, trigonometric, logarithmic and composite functions ➢ Able to find higher order derivatives ➢ Understand and work with derivatives as rates of change in mathematical models ➢ Find local maxima and minima of a function	4.1 Derivatives of continuous functions in an interval (List of formulae) 4.2 Rules of differentiation 4.3 Successive differentiation (up to second order) 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. ➢ Identify the methods to evaluate integrands ➢ Apply the skills to evaluate integrals representing areas and volumes	5.1 List of standard integrals and Basic rules of integration 5.2 Evaluation of integrals of simple function and their combination 5.3 Methods of integration 5.4 Concept of definite integrals 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° 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° 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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Government of Karnataka
Department of Collegiate and Technical Education
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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	10thLevel 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 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 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 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 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 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 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 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 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 Case Study 2b	**1, 4, 6, 7**	4	**R/U/A**	18	20

CO5	Conduct inspection of Projects and audit progress and bills 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 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 20th 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 7th 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 6th 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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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** • Introduction to Engineering drawing, • Drawing Instruments, Standard Sizes of Drawing sheets-Layout of drawing sheets, Folding of Drawing sheets as per Bureau of Indian Standards, • Types of lines and their applications, Conventions used in Civil Engineering ➢ **DIMENSIONING PRACTICE** • Introduction to Dimensioning, Elements of Dimensioning, Systems of Dimensioning, Methods of arrangements of Dimensioning • Representative Fraction and Scales recommended by the Bureau of Indian Standards(Reducing scale, Enlarging scale and Full scale) • Dimensioning of common features like diameters, radii, arcs and chords and simple Civil Engineering Objects.	**09**
2	➢ **GEOMETRIC CONSTRUCTIONS** • To divide a line into any number of equal parts • Construction of regular Polygons using different methods ➢ **CONIC SECTIONS** • Elements of Ellipse and Parabola • Applications of Ellipse and Parabola in engineering constructions • Construction of Ellipse by Concentric Circle method and Rectangle method • Construction of Parabola by Rectangle method and Parallelogram method	**06**
3	➢ **ORTHOGRAPHIC PROJECTION OF POINTS** • Introduction to orthographic projection-Principal planes of projection- Four Quadrants- Concept of First angle & Third angle projection • Methods-Projection of points in all the four quadrant system. Practicing exercises on projection of points in all four quadrants ➢ **ORTHOGRAPHIC PROJECTION OF LINES** • 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. • Practicing of exercises on projection of lines in different positioning	**12**

4	➢ **ORTHOGRAPHIC PROJECTION OF PLANES** • 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. • Practicing of exercises on projection of planes in different positioning ➢ **ORTHOGRAPHIC PROJECTION OF SOLIDS** • Introduction-Positioning of solids -Solid lying with base on HP- 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) • Practicing of exercises on projection of solids in different positioning	**15**
5	➢ **ISOMETRIC VIEWS** • Principles of isometric Views, Isometric views of regular polygons. • Conversion of orthographic views into isometric View- Drawing of Isometric views of solids like prisms, pyramids, cylinder and cone. • Conversion of orthographic views into isometric View -Drawing of Isometric views of combination of solids and simple civil engineering objects • Conversion of isometric views into orthographic views	**18**
6	**BASIC CADD IN CIVIL ENGINEERING** ➢ **Introduction to CADD** • General features of CADD, CADD work station, Hardware and Software requirements • Advantages of using CADD, Starting CADD, Understanding CADD • Editor Screen- title bar, menu bar, dashboard, standard tool bar, drawing area, UCS, command prompt area, status bar. ➢ **Demonstration of commands in CADD** • Commands- Command Entry Options using -Command Line, Menus (File Edit, View, Insert, Format, Tools, Draw, Dimension, Modify, Window, Help) and Dialog Boxes. • Understanding the use of CADD Menus and Tool Bars • 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 • Direct distance entry and line command, picking coordinates on the screen and line command • Using a wizard, using a template, starting from scratch. • Selection of units, Selection of paper space, Setting up of limits • Four Exercises on 2 Dimensional drawings • Exercises on isometric views(Conversion of Orthographic projection to Isometric view) • 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, • Drawing Instruments, Standard Sizes of Drawing sheets • 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 • Introduction to Dimensioning, Elements of Dimensioning, Systems of Dimensioning • 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) • 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 • Construction of regular Polygons using different methods • Elements of Ellipse and Parabola	CO2	1,2,4	12
	• Applications of Ellipse and Parabola in engineering constructions • Construction of Ellipse by Concentric Circle method and Rectangle method • 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 • Principal planes of projection- Four Quadrants • Concept of First angle & Third angle projection method	CO3	1,2,4	18
	• Projection of points in all the four quadrant system. • Exercises on projection of points in all four quadrants	CO3	1,2,4	21
	• Introduction to projection of line • Projections of Line Parallel to both HP and VP • 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 • 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. • Projection of plane surfaces parallel to one plane and perpendicular to the other • 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 • Exercises on projection of planes	CO3	1,2,4	33
	• Introduction-Positioning of solids • Solid lying with base on HP • Solids lying with base or axis inclined to HP.	CO3	1,2,4	36
	• Positioning of solid with lateral faces, lateral edge on HP • 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 • 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** • General features of CADD, CADD work station, Hardware and Software requirements, • Advantages of using CADD, Starting CADD • Understanding CADD Editor Screen- title bar, menu bar, dashboard, standard tool bar, drawing area, UCS, command prompt area, status bar. ➢ **Demonstration of commands in CADD** • Commands- Command Entry Options using -Command Line, Menus (File, Edit, View, Insert, Format, Tools, Draw, Dimension, Modify, Window, Help) and Dialog Boxes. 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 • Direct distance entry and line command, picking coordinates on the screen and line command. • Using a wizard, using a template, starting from scratch. • 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 Or ii. Question from Unit 3	25
B)	i. Question from Unit 4 Or 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 https://www.youtube.com/watch?v=w2-a_EzO4-Q https://www.youtube.com/results?search_query=dimensioning
UNIT 2	https://www.youtube.com/watch?v=rt7qTvPYVXE 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 https://www.youtube.com/watch?v=YV4RZNQ2yB8&list=PLIhUrsYr8yHxARPzEFz1nXgt8j6xF_tEm
UNIT5	https://www.youtube.com/watch?v=Vo9LC9d7FQA&list=PLIhUrsYr8yHxVky7bfrnbRcdXcHjTK83 https://www.youtube.com/watch?v=f1Hdtf_iAWk
	https://www.youtube.com/watch?v=It2jXzsXrVw&list=PLrOFa8sDv6jd0R3IzK-olrYadMkwsDG2g

UNIT6	http://www.sketchup.com http://www.autodesk.in/products/3ds-max/overview http://www.we-r-here.com/cad/tutorials/index.htm http://www.cadtutor.net/tutorials/CADD/ http://www.caddprimer.com/CADD_training_tutorial/CADD_training_lessons.html http://www.CADDmark.com/ http://www.CADDtutorials.net/ https://www.youtube.com/watch?v=J2LiXosRKKk 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. ❖ Focus should be on proper selection of drawing instruments and their proper use. ❖ Emphasis should be given on cleanliness, dimensioning and layout of sheet. ❖ Course coordinator should show model of real component/part and should give live applications of those, whose drawing is to be made. ❖ 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 ❖ At regular interval students should be assessed for the skill attainment. ❖ Encourage students for improvement in performance through skill tests and portfolio Evaluation ❖ 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. ❖ Separate CADD labs and drawing room for practice on Engineering graphics should be set up ❖ 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. ❖ Plot the different line styles used in Civil Engineering drawing. ❖ Collect and measure the dimensions of different paper sizes available in market. ❖ Develop a 3D model of simple objects like cube, prism, cylinder and cone. ❖ Develop a conic section ❖ Object of preparing models - Learn the art of **ORIGAMI** to prepare models • Rectangular prism, Rectangular pyramid, • Triangular prism and pyramid, Square prism and pyramid, • Pentagonal prism and pyramid, • Hexagonal prism and pyramid ,

	• Octagonal prism and pyramid, • Decagonal prism and pyramid, • Cube, cone , cylinder, tetrahedron, octahedron • 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

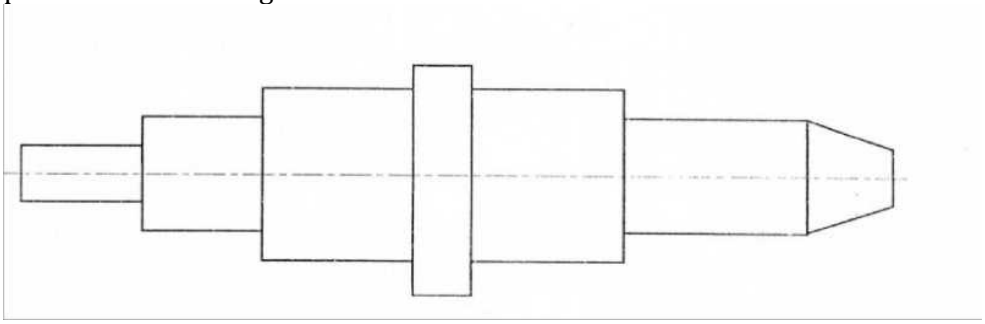
Course: **CIVILENGINEERING GRAPHICS** Code: **20CE21P**

UNIT-I

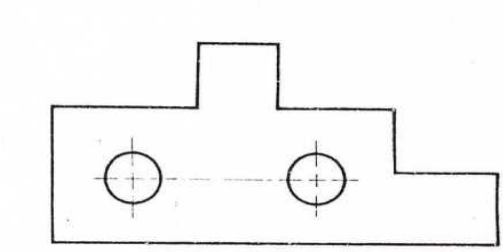
10 Marks Questions

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)

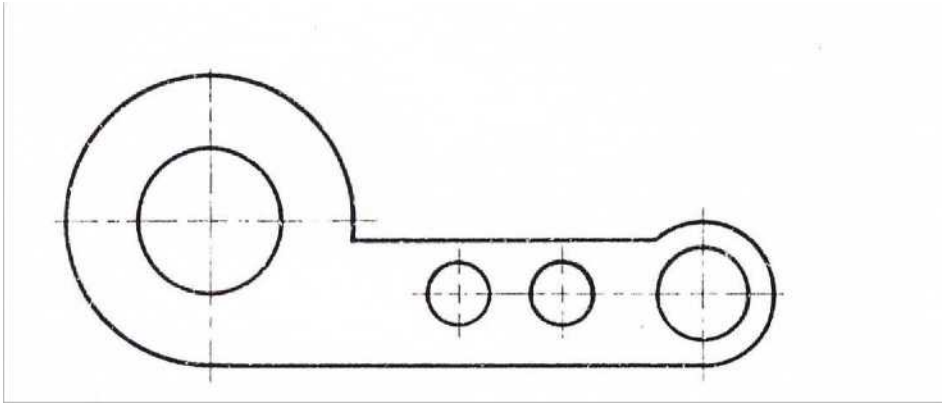
4. Copy the given sketch to 1:1 scale and dimension adopting aligned system with parallelDimensioning method.



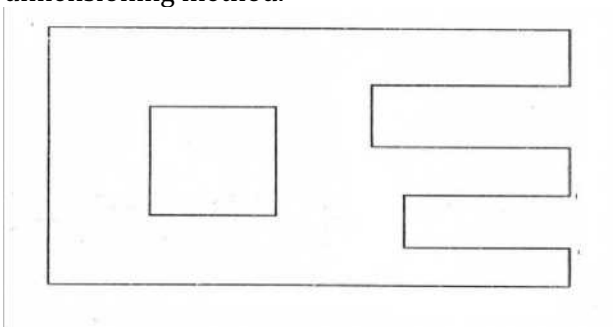
5. Copy the given sketch to 1:1 scale and dimension adopting aligned system with progressive dimensioning method.



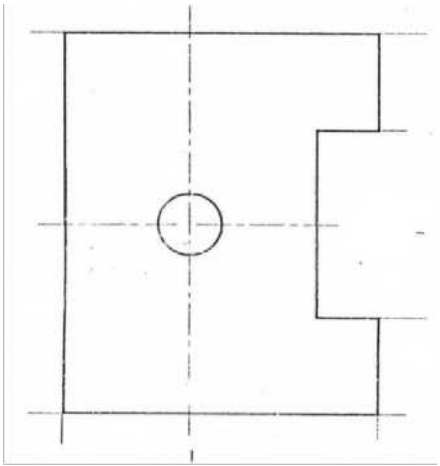
6. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with chain dimensioning method.



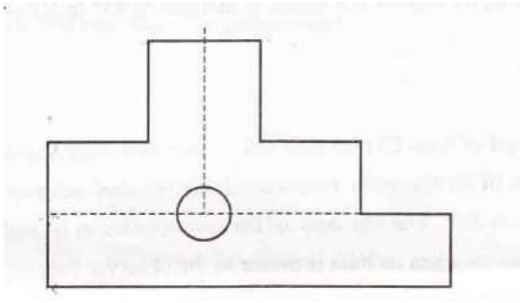
7.Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with combined dimensioning method.



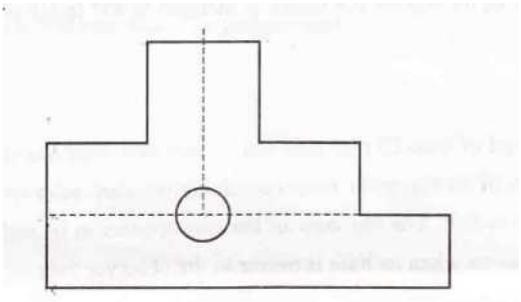
8. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with parallel dimensioning method.



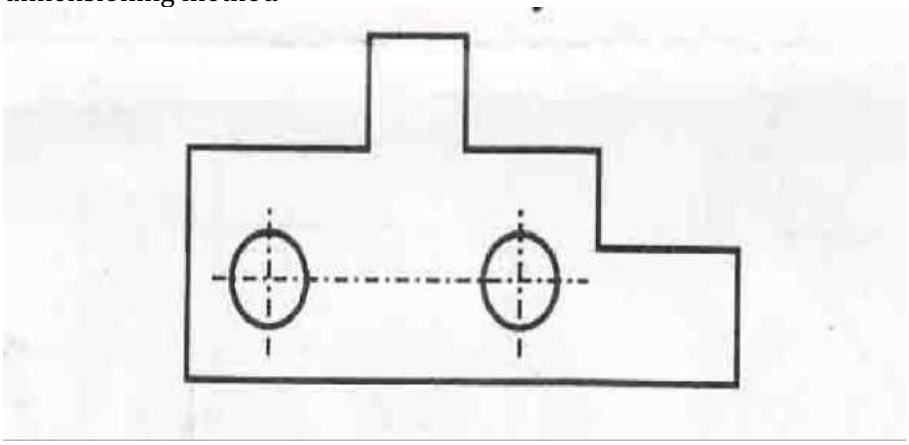
9. Copy the given sketch to 1:1 scale and dimension adopting aligned system with chain dimensioning method.



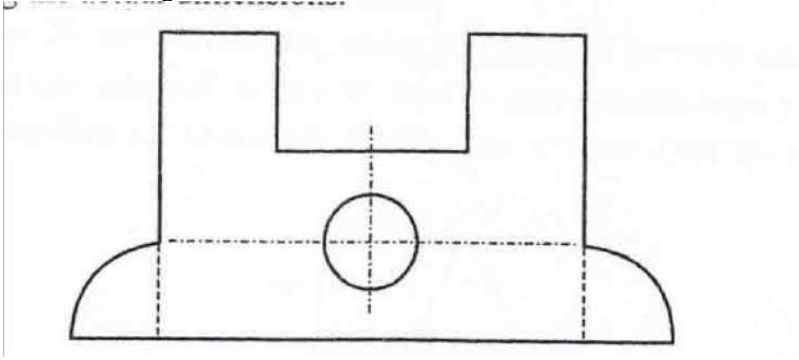
10. Copy the given sketch to 2:1 scale and dimension adopting aligned system with chain dimensioning method



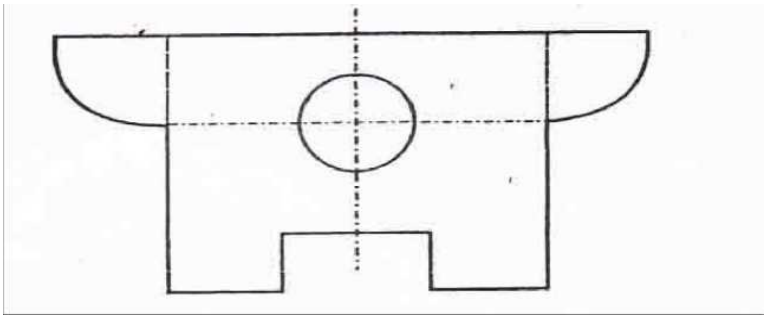
11. Copy the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



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.

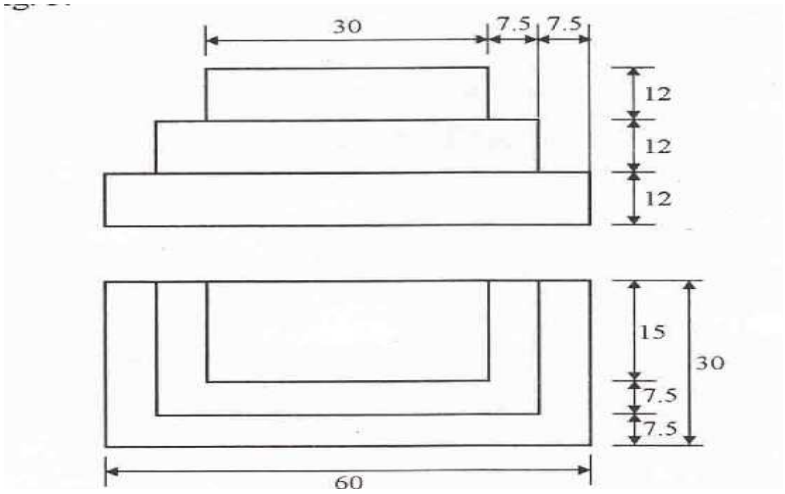
67. A hexagonal pyramid, base 30mm side and axis 60mm long has one of its slant edges on HP such that two of its triangular faces containing the slant edge on which it rests are equally inclined to HP. The top view of the axis appears to be inclined at 45° to VP. Draw its projections when its base is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

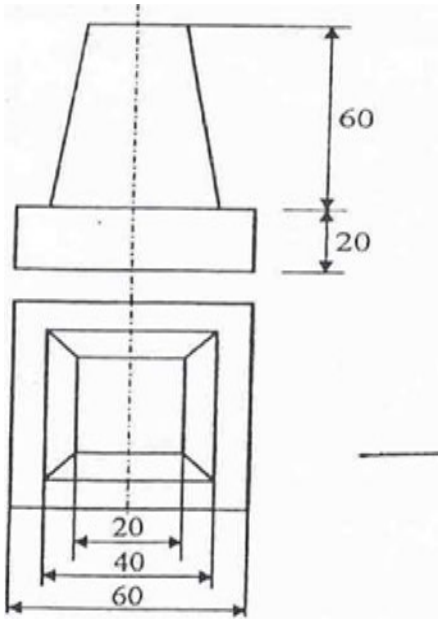
69. Draw the top and front views of a right cylinder of base 45mm diameter and 60mm long when it lies on HP, such that its axis is inclined at 30° to HP and the axis appears to be perpendicular to the VP in the top view

UNIT V **(15 marks questions)**

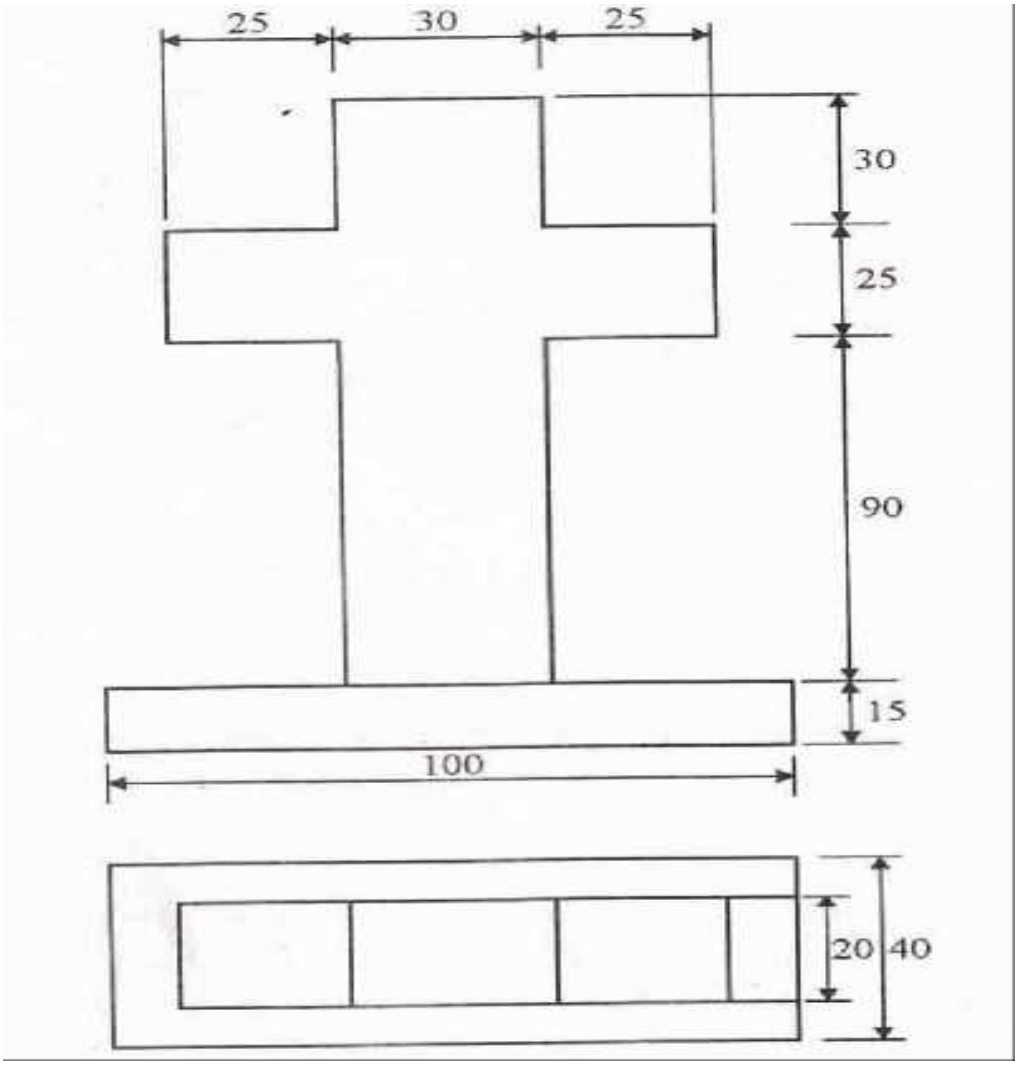
1. Draw the isometric view of the following objects whose orthographic views are given below:



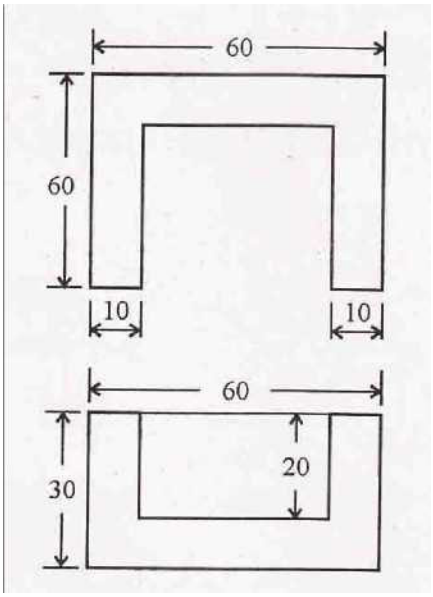
2. Draw the isometric view of the following objects whose orthographic views are given below



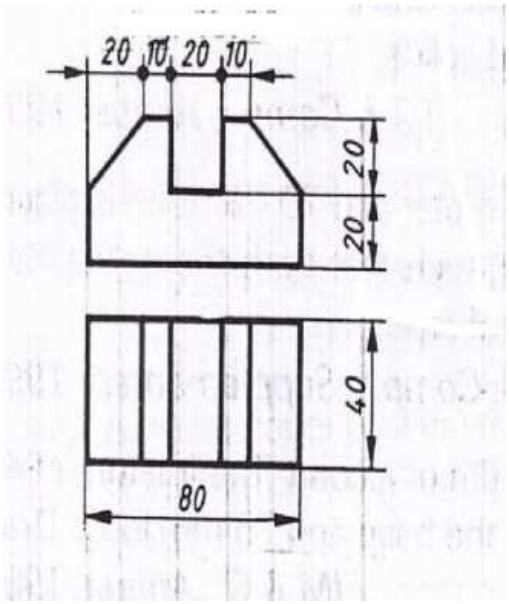
3. Draw the isometric view of the following objects whose orthographic views are given below

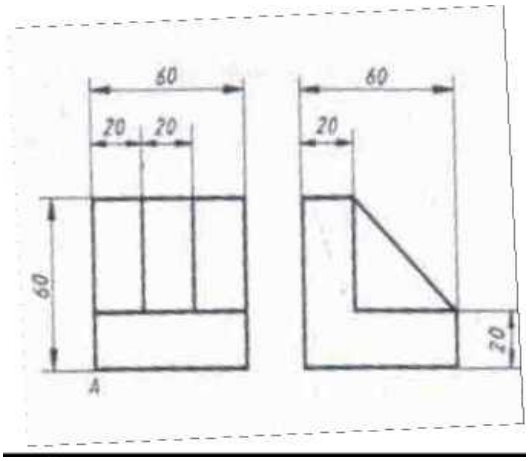

25
30
25
30
25
90
15
100
20
40

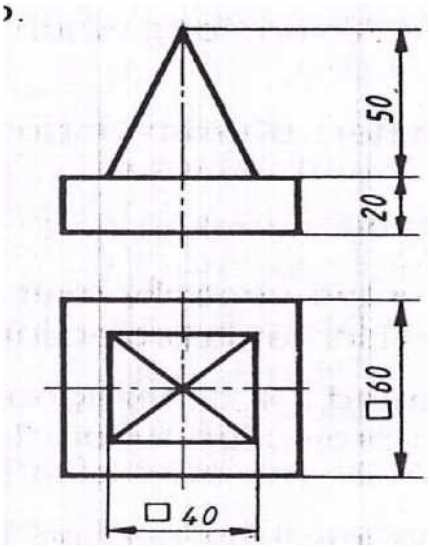
4.. Draw the isometric view of the following objects whose orthographic views are given below



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

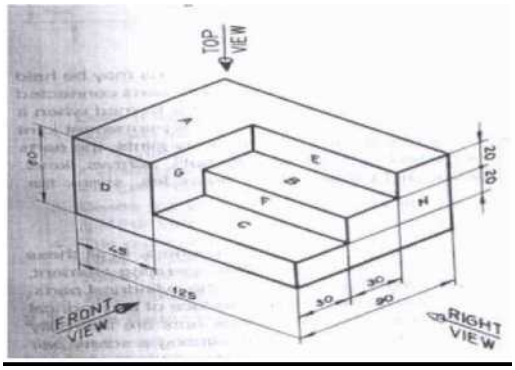


Fig-2

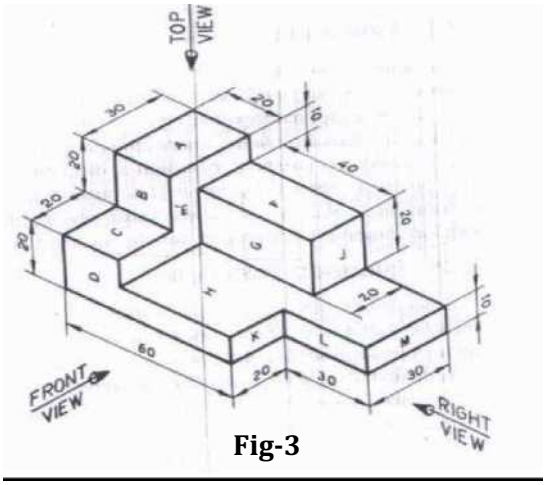


Fig-3

Fig-4

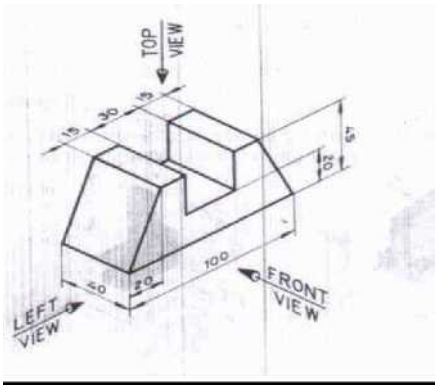


Fig-5

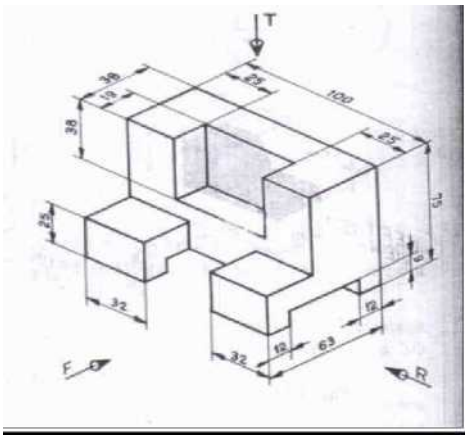


Fig-6

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 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 INTRODUCTION	Introduction to surveying occupation 1)Definition, Objectives, and purposes of surveying. 2)Primary divisions and classifications of surveying 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. 1.2 Classifications based on nature of field, purpose of survey and instruments used. 1.3 Conversion of units (simple problems) Errors in surveying: Types-Mistakes, systematic and accidental.	02-00-04 (02 class of 3Hr duration)
UNIT-2 CHAIN SURVEY	- Describe the procedure of finding the distance between two inter-visible and non inter-visible survey stations. - Explain the method of ranging and measuring the length of the given survey line with examples. - Explain the corrections in measurement of distance with the chain in a given situation. - Compute area of given open field by using chain and cross staff. - Select type of chaining for given situation. - 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. 2.2 Ranging: Direct Ranging (I.By naked Eye II.using Line Ranger) and Indirect Ranging. 2.3 Chaining on flat ground and Chaining on sloping ground-by stepping method only. 2.4 Chain triangulation: Chain survey Station, Base line, Checkline, Tie line, Offset, Tie station. Selection of survey stations. Method of Chaining, obstacles in chaining; simple problems. Types of offsets: I. Perpendicular and Oblique. II.Short and Long offsets. 2.5 Errors in length: Instrumental error, personal error, error due to natural cause, random error- No numerical problems. 2.6 Location Sketch of survey station and running measurements of building.	05-00-10 (05 class of 3 Hr duration)

		2.7 Conventional Signs Recording of measurements in a field book.	
UNIT-3 COMPASS SURVEY	- Carry out the traversing in a given situation by using compass and chain. - Convert the given whole to reduced bearing and vice versa to find the included angle with examples. - Explain construction and functions of given parts of the given type of compass. - Determine correct bearings from the given observed bearings. - Explain the methods used to plot a traverse in the given situation. - 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) 3.2 Components of Prismatic Compass and their Functions, Method of using Prismatic Compass- temporary adjustments and observing bearings. 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) 3.4 Magnetic dip and declination: simple problems on declination. 3.5 Local attraction, sources of local attraction, detection of local attraction, Methods of correction of observed bearings-Correction at station. 3.6 plotting a traverse and finding closing errors. 3.7 Errors in compass: Instrumental, Personal and natural cause.	08-00-16 (08 class of 3 Hr duration)
	- Explain the given terms related to leveling. - 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. 4.2 Instruments used for levelling:Types of levels: Dumpy, Auto level, Digital	

UNIT-4 LEVELLING	- Explain the given temporary adjustments of a typical dumpy level. - Describe methods of reduction of levels by height of collimation and rise and fall method in the given situation with necessary checks. - Select type of leveling for the given work with examples and justification. - 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. 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. Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling. 4.5 Methods to find the R. L. in Level Book by H.I & Rise and Fall Methods with necessary checks. 4.7 Computation of missing readings. 4.8 Errors in Leveling	11-00-22 (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 2. Electrical safety • Identify Various types of safety signs and what they mean • Demonstrate and practice use of PPE • Demonstrate how to free a person from electrocution • Administer appropriate first aid to victims, bandaging, heart attack, CPR, etc. • Fire safety, causes and precautionar y activities. • Use of appropriate fire extinguishers on different types of fires. • Demonstrate rescue techniques applied during fire hazard, correct method to move injured people during emergency • Inform relevant authority about any abnormal situation • Earthing: Types	1. Electrical symbols related to electrical engineering. 2. Electrical safety 3. Electrical earthing	02-00-04

		➢ http://nreeder.com/Flash/symbols.htm ➢ http://bouteloup.pierre.free.fr/iufm/as/de/house/safety.html		
UNIT-2 Electrical Fundamentals				
2	1. Identify and select the different measuring devices. 2. Identify different electrical supply systems 3. Identify open circuit, close circuit and short circuit conditions.	1. Describe the sources of electrical energy. 2. Electrical current, voltage, emf, potential difference, resistance with their SI units. 3. Mention the meters used to measure different electrical quantities. Identification Measuring devices • Ammeter • Voltmeter • Wattmeter • Ohmmeter • Digital Multimeter • Megger • Tong tester 4. Explain supply systems like AC, DC. ➢ 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) • Behavior of V, I in Series and Parallel DC circuits. • Describe open circuit, close cir cuit and short circuit • http://nreeder.com/Flash/ohmsLaw.htm	1. Measure current, voltage and analyze effective resistance in seriescircuit 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 2. Equation to find effective Resistances connected in parallel 3. Resistances connected series and parallel combinations 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. ➢ http://nreeder.com/Flash/freqPeriod.htm ➢ 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 2. Identify and differentiate Single phase and Three phase supply	1. Electrical work, power and power factor • SI units • Mention the meters used to measure them ➢ 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 • SI units • Mention the meters used to measure them 2. Single phase and Three phase supply.	1. Measure single phase energy using relevant measuring instruments in a Single-phase load. 2. Measure the voltages in Three phase supply.	
UNIT-3 Protective Devices and Wiring circuits				
8.	1. Identify and select Protective Devices for given current and voltage rating 2. Identify and select the various electrician tools	• Necessity of Protective Devices • Various Protective devices and their functions •fuse wire, •Glass cartridge fuse • HRC fuse • Kit-kat fuse • MCB • MCCB • RCCB • ELCB • Relay • Different types of electrician tools and their function. • Describe various wiring tools. • 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 2. Identify and select the cables used for different current and voltage ratings. 3. Draw the wiring diagram	1. Describe different types of wiring systems. • Surface conduit • concealed conduit • PVC casing capping 2. Wiring systems and their applications. 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 Electrical Machines and Batteries and UPS				
11	1. Identify the types of transformer. 2. verify the transformation ratio.	**Transformer** • working principle • Transformation ratio • 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. 2. Troubleshoot DOL/Star-delta starter and induction motor	1. **Induction motor** • Single phase and three phase Induction motor. • Necessity of starters. • Describe DOL AND STAR-DELTA starters. 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. 2. Troubleshoot the DOL/ Star-delta starter and induction motor	2:0:4
13	Select and test the battery for a given application	**Battery** • Types of batteries (Lead acid battery, lithium, sealed maintenance free (SMF) battery, Modular battery). • Selection criteria of batteries for different applications. • Ampere-Hour Capacity. • 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** • List the types and applications • Selection criteria of UPS • Sizing of UPS	Sizing of UPS	1:0:2

UNIT-5 Introduction to Electronic Devices and Digital Electronics				
15	Identify and differentiate Conductors, insulators and semiconductors.	1.Compare Conductors, insulators and semiconductors with examples. 2. Identification of types and values of resistors-color codes. ➢ 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** • Symbol • Characteristics • Diode as switch. • Types of diodes and ratings • 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** • Need for AC to DC conversion • Bridge rectifier with and without C filter, • Rectifier IC.	Construct and test bridge rectifiers using semi-conductor diode and rectifier IC. Compare the waveforms using CRO.	1:0:2
18	1. Identify and test Transistor 2. Build and test transistor as an electronic switch	**Transistor (BJT)** • Symbol • Structure • Working principle	1. Identification of transistor terminals and test. 2. Construct and test the transistor as an electronic switch	1:0:2
19.	1. Identify and test different digital IC 1.	• Comparison of analog and digital signal • Digital systems, examples. • Binary numbers, Boolean identities and laws. • Digital system building blocks: Basic logic gates, symbols and truth tables. IC-Definition and advantages.	• Test a Digital IC. • Identification and selection of suitable ICs for basic gates. 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** • Concept • Types: Temperature, Pressure, Water, Light, Sound, Smoke, proximity Sensors, Flow, humidity, voltage, vibration, IR (Principle/working, ratings/ specifications, cost, and applications) **2.Actuators** • Concept • Types and applications. • Relay as an actuator.	2. Connect and test an IR proximity sensor to a Digital circuit. • Connect and test a relay circuit using an Opto-coupler. (Photo Diode & Transistor) **Refer note**	2:0:4

21	Know the application of Microcontroller and PLC	• Microcontroller as a programmable device, and list of real-world applications. • PLC and Their applications. (Activity based learning)	• Identify different application microcontroller. • 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 • Demonstrate how to free a person from electrocution appropriate first aid to victims, bandaging, heart attack, CPR, etc. • Fire safety, causes and precautionary activities. • Use of appropriate fire extinguishers on different types of fires. • Demonstrate rescue techniques applied during fire hazard. • 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. • 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. 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 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) - At the end of **3rd week**	60 minutes	20	Average of two written tests 20	
2.	CIE Assessment 2 (Written Test -2-theory) - At the end of **13th week**	60 minutes	20		
3.	CIE Assessment 3 (Skill test) - At the end of **5th week**	3 Hours	100	20	Average of three skill tests 20
4	CIE Assessment 4 (Skill test) - At the end of **7th week**	3 Hours	100		
5	CIE Assessment 5 (Skill test) - At the end of **9th week**	3 Hours	100		
6	CIE Assessment 6 (Student activity) - 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) 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 a) 0 - 1 V b) 0 - 10 V c) 0 - 30 V	Each 05 Nos.
4	Portable Moving Iron AC Voltmeters a) 0 - 300 V b) 0 - 600 V	Each 05 Nos.
5	Portable Moving Coil DC Ammeters a) 0 - 100 mA b) 0 - 1 A c) 0 - 2 A	Each 05 Nos.
6	Portable Moving Iron AC Ammeters a) 0 - 2 A b) 0 - 5 A c) 0 - 10 A	Each 05 Nos.
7	Watt-meters a) 150/ 300V, 2 A, UPF 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 b) Cap and casing - ¾" - 10 lengths c) Switches Single Pole- 5A, 230 V d) Switches two way – 5 A, 230 V e) 3 Pin Sockets 5A, 230 V f) Bulb Holders – 5 A, 230 V g) 3 Pin Plug 5A, 230 V h) 60 Watts Lamps i) 100 Watts Lamps j) 15 W CFL lamps k) Copper Wires of sizes 1.5 mm^2, 2.5 mm^2, 4 mm^2 – 1 coil each l) Gang boxes (1+1, 2+1, 2+2) m) Kit –Kat fuses 5A, 15 A n) MCB 16 A & 32 A/ 230 V, Single and Double Pole o) ELCB 16 A & 32 A/ 230 V, Double Pole p) Neutral link- 16 A, 230 V q) Screws of assorted sizes r) Testers	Each 10 Nos.

24		Electronic Components a) Diodes - BY 127 and IN 4001 b) Zener Diodes – 6.2 V, 5.6 V, 7.8 V c) Relays – solid state Sugar cube type, SPST, Coil 6V, Power circuit 230 V, 5 A. d) Spring Boards e) Bread Boards 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 26Hrs Per Semester	Teaching Scheme (L:T:P)= 2:0:0	SEE Marks : Nil

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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 26 Hrs per Semester	Teaching Scheme (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 ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಂಪರೆ ಮತ್ತು ರಾಜಾಶ್ರಯ ಕವಿರಾಜಮಾರ್ಗ ಮತ್ತು ವಡ್ಡಾರಾಧನೆ	**03 ಗಂಟೆ**
4. ಪಂಪ / ಚಂಪೂ ಯುಗದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಮತ್ತು ಪರಂಪರೆ	
ಆದಿಕವಿ ಪಂಪ, ರನ್ನ, ಪೊನ್ನ, ಜನ್ನ. ಒಂದನೇ ನಾಗವರ್ಮ ಮತ್ತು ನಾಗಚಂದ್ರ 10 ಮತ್ತು 11ನೇ ಶತಮಾನದ ಸಮಕಾಲೀನ ಪ್ರಮುಖ ಕವಿಗಳು	**04 ಗಂಟೆ**
5. ನಡುಗನ್ನಡ ಸಾಹಿತ್ಯ - ವಚನ ಸಾಹಿತ್ಯ / ಬಸವ ಯುಗ	
ವಚನ ಸಾಹಿತ್ಯದ ಬೆಳವಣಿಗೆಗೆ ಕಾರಣಗಳು ಮತ್ತು ಅದರ ಮಹತ್ವ ಪ್ರಮುಖ ವಚನಕಾರರು, ವಚನ ಸಾಹಿತ್ಯದಲ್ಲಿ ವೈಚಾರಿಕತೆ ಮತ್ತು ಕಾಯಕ ತತ್ತ್ವ	**04 ಗಂಟೆ**
6. ಕುಮಾರವ್ಯಾಸ ಯುಗ ಮತ್ತು ಸಾಹಿತ್ಯದ ಇತರೆ ರೂಪಗಳು	
ರಗಳೆ – ಹರಿಹರ, **ಷಟ್ಪದಿ –** ಕುಮಾರವ್ಯಾಸ, ಲಕ್ಷ್ಮೀಶ ಮತ್ತು ರಾಘವಾಂಕ **ಸಾಂಗತ್ಯ -** ರತ್ನಾಕರವರ್ಣಿ,	**04 ಗಂಟೆ**
7. ದಾಸ ಸಾಹಿತ್ಯ / ಕೀರ್ತನೆಗಳು ಪುರಂದರದಾಸರು, ಕನಕದಾಸರು ಮತ್ತು ಇತರೆ ಕೀರ್ತನೆಕಾರಾರು	**02 ಗಂಟೆ**
8. ಇತರೆ ಸಾಹಿತ್ಯದ ಪ್ರಕಾರಗಳು **ತ್ರಿಪದಿ** - ಸರ್ವಜ್ಞ, **ಜಾನಪದ ಸಾಹಿತ್ಯ,** **ತತ್ತ್ವಪದಗಳು** - ಶಿಶುನಾಳ ಶರೀಫರು	**04 ಗಂಟೆ**
9. ಮಹಿಳಾ ಸಾಹಿತ್ಯ : ಹೆಳವನಕಟ್ಟೆ ಗಿರಿಯಮ್ಮ ಮತ್ತು ಸಂಚಿಹೊನ್ನಮ್ಮ, **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**