Visvesvaraya Technological University, Belagavi

REGULATIONS GOVERNING
THE DEGREE OF BACHELOR OF ENGINEERING/ TECHNOLOGY (B.E/B.Tech)
UNDER CHOICE BASED CREDIT SYSTEM (CBCS)
Effective from the academic year 2017−18

Annexure -1

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2017-2018
Choice Based Credit System (CBCS)

I SEMESTER B.E./B.Tech. (PHYSICS GROUP)

Sl. No	Course Code	Course Title	Teaching Department	Board	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
					Teaching Hours /Week		Examination				
1	17MAT11	Engineering Mathematics -I	Mathematics	Basic Science	04	--	03	60	40	100	4
2	17PHY12	Engineering Physics	Physics	Basic Science	04	--	03	60	40	100	4
3	17CIV13	Elements of Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	04	--	03	60	40	100	4
4	17EME14	Elements of Mechanical Engineering	Mechanical Engineering	Mechanical Engineering	04	--	03	60	40	100	4
5	17ELE17	Basic Electrical Engineering	E and E Engineering	E and E Engineering	04	--	03	60	40	100	4
6	17WSL16	Workshop Practice	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	01Hour Instruction 02Hour Practical		03	60	40	100	2
7	17PHYL17	Engineering Physics Laboratory	Physics	Basic Science	01Hour Instruction 02Hour Practical		03	60	40	100	2
8	17ENG18	Language – English (Audit Course)	Humanities	--	01		--	--	--	--	--
				TOTAL	**Theory:21 hours Practical: 06 hours**		21	420	280	700	24

II SEMESTER B.E./B.Tech. (CHEMISTRY GROUP)

Sl. No	Course Code	Course Title	Teaching Department	Board	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	17MAT21	Engineering Mathematics -II	Mathematics	Basic Science	04	--	03	60	40	100	4
2	17CHE22	Engineering Chemistry	Chemistry	Basic Science	04	--	03	60	40	100	4
3	17PCD23	Programming in C and Data Structures	Any Engineering Department	Computer Science and Engineering	04	--	03	60	40	100	4
4	17CED24	Computer Aided Engineering Drawing	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	02Hour Instruction 04-Hour Practice		03	60	40	100	4
5	17ELN25	Basic Electronics	ECE/EEE/TC/E and I.	E and C Engineering	04	--	03	60	40	100	4
6	17CPL26	Computer Programming Laboratory	Any Engineering Department	Computer Science and Engineering	01Hour Tutorial 02Hour Practical		03	60	40	100	2
7	17CHEL27	Engineering Chemistry Laboratory	Chemistry	Basic Science	01Hour Tutorial 02Hour Practical		03	60	40	100	2
8	17CIV28	Environmental Studies (Audit Course)	Civil/ Environmental Engineering	Civil Engineering	01Tutorial		--	30	20	50	--
				TOTAL	**Theory:21 hours Practical: 06 hours**		21	450	300	750	24

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I SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No	Course Code	Course Title	Teaching Department	Board	Teaching Hours /Week Theory	Teaching Hours /Week Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	17MAT11	Engineering Mathematics -I	Mathematics	Basic Science	04	--	03	60	40	100	4
2	17CHE12	Engineering Chemistry	Chemistry	Basic Science	04	--	03	60	40	100	4
3	17PCD13	Programming in C and Data Structures	Any Engineering Department	Computer Science and Engineering	04	--	03	60	40	100	4
4	17CED14	Computer Aided Engineering Drawing	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	02Hour Instruction 04Hour Practice		03	60	40	100	4
5	17ELN17	Basic Electronics	ECE/EEE/TC/E and I.	E and C Engineering	04	--	03	60	40	100	4
6	17CPL16	Computer Programming Laboratory	Any Engineering Department	Computer Science and Engineering	01Hour Tutorial 02Hour Practical		03	60	40	100	2
7	17CHEL17	Engineering Chemistry Laboratory	Chemistry	Basic Science	01Hour Tutorial 02Hour Practical		03	60	40	100	2
8	17CIV18	Environmental Studies (Audit Course)	Civil/ Environmental Engineering	Civil Engineering	01HourTutorial		--	30	20	50	--
				TOTAL	**Theory:21 hours** **Practical: 08 hours**		**21**	**450**	**300**	**750**	**24**

II SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No	Course Code	Course Title	Teaching Department	Board	Teaching Hours /Week Theory	Teaching Hours /Week Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	17MAT21	Engineering Mathematics -II	Mathematics	Basic Science	04	--	03	60	40	100	4
2	17PHY22	Engineering Physics	Physics	Basic Science	04	--	03	60	40	100	4
3	17CIV23	Elements of Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	04	--	03	60	40	100	4
4	17EME24	Elements of Mechanical Engineering	Mechanical Engineering	Mechanical Engineering	04	--	03	60	40	100	4
5	17ELE25	Basic Electrical Engineering	E and E Engineering	E and E Engineering	04	--	03	60	40	100	4
6	17WSL26	Workshop Practice	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	01-Hour Instruction 02-Hour Practical		03	60	40	100	2
7	17PHYL27	Engineering Physics Laboratory	Physics	Basic Science	01-Hour Instruction 02-Hour Practical		03	60	40	100	2
8	17ENG28	Language – English (Audit Course)	Humanities	--	01		--	--	--	--	--
				TOTAL	**Theory:21 hours** **Practical: 06 hours**		**21**	**420**	**280**	**700**	**24**

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Scheme of Teaching and Examination 2017-2018
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B.E./B.Tech_____

III SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
					Teaching Hours /Week			**Examination**			
1	17MAT31	Core Course	Engineering Mathematics-III		04	--	03	60	40	100	4
2	17XX32	Core Course			04	--	03	60	40	100	4
3	17XX33	Core Course			04	--	03	60	40	100	4
4	17XX34	Core Course			04	--	03	60	40	100	4
5	17XX35	Core Course			04	--	03	60	40	100	4
6	17XX36	Foundation Course			03	--	03	60	40	100	3
7	17XXL37	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
8	17XXL38	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
9	17KL/CPH39/49	Core Course	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	01
				TOTAL	Theory:24hours Practical: 06 hours		25	510	340	850	28

1. **Core Course:** This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.
2. **Foundation Course:** The courses based upon the content that leads to Knowledge enhancement.
3. **Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/ Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.
4. **Audit Course:**
(I) All lateral entry students (except B.Sc candidates) have to register for Additional Mathematics – I which is 03 contact hours per week.

1	17MATDIP31	Additional Mathamatics - I	03		03	60	-	60	-

(ii) Language English (Audit Course) be compulsorily studied by all lateral entry students (except B. Sc candidates)

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IV SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
					Teaching Hours /Week		Examination				
1	17MAT41	Core Course	Engineering Mathematics-IV		04	--	03	60	40	100	4
2	17XX42	Core Course			04	--	03	60	40	100	4
3	17XX43	Core Course			04	--	03	60	40	100	4
4	17XX44	Core Course			04	--	03	60	40	100	4
5	17XX45	Core Course			04	--	03	60	40	100	4
6	17XX46	Foundation Course			03	--	03	60	40	100	3
7	17XXL47	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
8	17XXL48	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
9	17KL/CPH39/49	Core Course	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	01
			TOTAL		Theory:24hours Practical: 06 hours		25	510	340	850	28

1. **Core Course:** This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. **Foundation Course:** The courses based upon the content that leads to Knowledge enhancement.

3. **Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/ Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.

4. **Audit Course:**

(I) All lateral entry students (except B. Sc candidates) have to register for Additional Mathematics – II which is 03 contact hours per week.

| 1 | 17MATDIP41 | | Additional Mathamatics - II | | 03 | | 03 | 60 | – | 60 | -- |

(ii) Language English (Audit Course) be compulsorily studied by all lateral entry students (except B. Sc candidates)

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B.E./B.Tech_____

V SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	17XX51	Core Course	Management and Entrepreneurship Excluding CSE, ISE and EV Programs. (The course must be related to Management and Entrepreneurship. However, the title and syllabus content can be as per the programme requirement).		04	--	03	60	40	100	4
2	17XX52	Core Course			04	--	03	60	40	100	4
3	17XX53	Core Course			04	--	03	60	40	100	4
4	17XX54	Core Course			04	--	03	60	40	100	4
5	17XX55X	Professional Elective			03	--	03	60	40	100	3
6	17XX56Y	Open Elective			03	--	03	60	40	100	3
7	17XXL57	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
8	17XXL58	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
				TOTAL	Theory:22hours Practical: 06 hours		24	480	320	100	26

Electives

Professional Elective		Open Elective*** Offered by the Department of _____	
Courses under Code 17XX55X	Course Title	Courses under Code 17XX56Y	Course Title
17XX551		17XX561	
17XX552		17XX562	
17XX553		17XX563	
17XX554		17XX564	

*** Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives). Selection of an open elective is not allowed, if;

▫ The candidate has no pre – requisite knowledge.
▫ The candidate has studied similer content course during previous semesters.
▫ The syllabus content of open elective is similar to that of Departmental core course(s) or to be studied professional elective(s).

Registration to electives shall be documented under the guidance of Programme Coordinator and Adviser.

1. Core subject: This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. Professional Elective: Electives relevant to chosen specialization/ branch.

3. Open Elective: Electives from other technical and/ or emerging subject areas.

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B.E./B.Tech_____

VI SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Teaching Hours /Week		Examination				Credits
					Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	17XX61	Core Course	Management and Entrepreneurship Excluding CSE, ISE and EV Programs. (The course must be related to Management and Entrepreneurship. However, the title and syllabus content can be as per the programme requirement).		04	--	03	60	40	100	4
2	17XX62	Core Course			04	--	03	60	40	100	4
3	17XX63	Core Course			04	--	03	60	40	100	4
4	17XX64	Core Course			04	--	03	60	40	100	4
5	17XX65X	Professional Elective			03	--	03	60	40	100	3
6	17XX66Y	Open Elective			03	--	03	60	40	100	3
7	17XXL67	Laboratory				01-Hour Instruction 02-Hour Practical	03	60	40	100	2
8	17XXL68	Laboratory				01-Hour Instruction 02-Hour Practical	03	60	40	100	2
				TOTAL	Theory:22hours Practical: 06 hours		24	480	320	800	26

Electives

Professional Elective		Open Elective [***] Offered by the Department of _____	
Courses under Code 17XX65X	Course Title	Courses under Code 17XX66Y	Course Title
17XX651		17XX661	
17XX652		17XX662	
17XX653		17XX663	
17XX654		17XX664	

[***] Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives). Selection of an open elective is not allowed, if;

- The candidate has no pre – requisite knowledge.
- The candidate has studied similer content course during previous semesters.
- The syllabus content of open elective is similar to that of Departmental core course(s) or to be studied professional elective(s).

Registration to electives shall be documented under the guidance of Programme Coordinator and Adviser.

1. **Core subject:** This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.
2. **Professional Elective:** Electives relevant to chosen specialization/ branch.
3. **Open Elective:** Electives from other technical and/ or emerging subject areas.

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B.E./B.Tech_____

VII SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Teaching Hours /Week		Examination				
					Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	17XX71	Core Course			04	--	03	60	40	100	4
2	17XX72	Core Course			04	--	03	60	40	100	4
3	17XX73	Core Course			04	--	03	60	40	100	4
4	17XX74 X	Professional Elective			03	--	03	60	40	100	3
5	17XX75Y	Professional Elective			03	--	03	60	40	100	3
6	17XXL76	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
7	17XXL77	Laboratory			01-Hour Instruction 02-Hour Practical		03	60	40	100	2
8	17XXP78	Core Course	Project Phase – I and Project seminar			03	--	--	100	100	2
				TOTAL	Theory:18 hours Practical and Project: 09 hours		21	420	380	800	24

Electives

Professional Elective		Professional Elective	
Courses under Code 17XX74X	Course Title	Courses under Code 17XX75Y	Course Title
17XX741		17XX751	
17XX742		17XX752	
17XX743		17XX753	
17XX744		17XX754	

1. **Core subject:** This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.
2. **Professional Elective:** Electives relevant to chosen specialization/ branch.
3. **Project Phase – I and Project seminar:** Comprises of Literature Survey, Problem identification, Objectives and Methodology. CIE marks shall be based on the report covering Literature Survey, Problem identification, Objectives and Methodology and seminar presentation skill.

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VIII SEMESTER

Sl. No	Course Code	Course	Course Title	Teaching Department	Theory	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
					Teaching Hours /Week		Examination				
1	17XX81	Core Course			04	--	03	60	40	100	4
2	17XX82	Core Course			04	--	03	60	40	100	4
3	17XX83X	Professional Elective			03	--	03	60	40	100	3
4	17XX84	Core Course	Internship/ Professional Practice		Working hours of the place of Internship		03	50	50	100	2
5	17XXP85	Core Course	Project work Phase -II		--	06	03	100	100	200	6
6	17XXS86	Core Course	Technical Seminar		--	04	--	--	100	100	1
			TOTAL		Theory:11 hours Project and Seminar: 10 hours		15	390	310	700	20

Professional Electives

Courses under Code 17XX83X	Course Title
17XX831	
17XX832	
17XX833	
17XX834	

1. **Core subject:** This is the course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

2. **Professional Elective:** Electives relevant to chosen specialization/ branch

3. **Internship/ Professional Practice:** To be completed between the (VI and VII semester vacation) and/or (VII and VIII semester vacation) period for 4 weeks

ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I

Course Code	:	17MAT11	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

* nth derivatives of product of two functions and polar curves.
* Partial derivatives
* Vector calculus
* Reduction formulae of integration; To solve First order differential equations.
* Solution of system of linear equations , quadratic forms.

Module - 1	Hours - 10

Differential Calculus -1:

Determination of nth order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems.

Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) -problems

Module - 2	Hours - 10

Differential Calculus -2:

Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms.

Partial derivatives – Definition and simple problems, Euler's theorem(without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians

Vector Calculus:

Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - $div(\phi A)$, $curl (\phi A)$, $curl(grad \phi)$, $div(curl A)$.

Integral Calculus:

Reduction formula $\int Sin^n x\, dx, \int Cos^n x\, dx, \int Sin^m x\, Cos^n x\, dx$ (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.

Differential Equations ;

Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations .Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

Linear Algebra

Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method .

Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonal-isation of a square matrix . Reduction of Quadratic form to Canonical form

Course outcomes:

On completion of this course, students are able to

* Use partial derivatives to calculate rates of change of multivariate functions.
* Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
* Recognize and solve first-order ordinary differential equations, Newton's law of cooling
* Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be 2 full questions(with a maximum of four sub questions) from each module.

* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics I,"** Wiley, 2013

Reference Books:
1. B.V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

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ENGINEERING CHEMISTRY

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code		17CHE12/17CHE22 CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

Course objectives:

To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields

* Electrochemistry & Battery Technology.
* Corrosion & Metal Finishing.
* Fuels & Solar energy.
* Polymers.
* Water Technology & Nano Materials.

<div align="center">Module - 1   Hours - 10</div>

Electrochemistry and Battery Technology

Electrochemistry : Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

Battery Technology : Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of $Li-MnO_2$ and Li-ion batteries.

Fuel Cells : Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.

Corrosion and Metal Finishing:

  Corrosion: Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings-Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

Metal Finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing-Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levellers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium(decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

Fuels and Solar Energy:

  Fuels: Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction, fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti knocking agents, power alcohol & biodiesel.

Solar Energy: Introduction, utilization and conversion, photovoltaic cells-construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (n&p types).

Polymers:

  Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (Tg): Factors influencing Tg-Flexibility, inter molecular forces, molecular mass, branching

& cross linking and stereo regularity. Significance of Tg. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber. Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.

Module - 5   Hours - 10

Water Technology and Nanomaterials:

Water Technology: Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion(due to dissolved O_2, CO_2 and $MgCl_2$). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis & electro dialysis (ion selective).

Nano Materials: Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, & nano composites.

Course outcomes:

On completion of this course, students will have knowledge in:
* Electrochemical and concentration cells. Classical & modern batteries and fuel cells.
* Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating.
* Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.
* Replacement of conventional materials by polymers for various applications.
* Boiler troubles; sewage treatment and desalination of sea water, and
* Over viewing of synthesis, properties and applications of nanomaterials.

Question paper pattern:
* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be 2 full questions (with a **maximum** of **four** sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., **"Chemistry for Engineering Students"**, Subhash Publications, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi.
3. P.C.Jain & Monica Jain.,**"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi.

Reference Books:
1. O.G.Palanna,**"Engineering Chemistry"**,Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.
2. G.A.Ozin & A.C. Arsenault, **"Nanochemistry A Chemical Approach to Nanomaterials"**, RSC publishing, 2005.
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition.
4. V.R.Gowariker, N.V.Viswanathan & J.Sreedhar., **"Polymer Science"**, Wiley-Eastern Ltd.
5. M.G.Fontana., **"Corrosion Engineering"**, Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.

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ENGINEERING PHYSICS

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	17PHY12/17PHY22	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course Objectives:

The Objective of this course is to make students learn and understand basic concepts and principles of physics to analyze practical engineering problems and apply its solutions effectively and meaningfully. To understand building up of models, design issues, practical oriented skills and problem solving challenges are the great task of the course. To know about shock waves and practical applications is the prime motto to introduce new technology at the initial stage of Engineering.

Module - 1	Hours - 10

Modern Physics and Quantum Mechanics

Black body radiation spectrum, Assumptions of quantum theory of radiation, Plank's law, Weins law and Rayleigh Jeans law, for shorter and longer wavelength limits. Wave Particle dualism, deBroglie hypothesis. Compton Effect. Matter waves and their Characteristic properties, Definition of Phase velocity and group velocity, Relation between phase velocity and group velocity, Relation between group velocity and particle velocity.

Heisenberg's uncertainity principle and its application, (Non-existence of electron in the nucleus).Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger wave equation. Eigen values and Eigen functions. Application of Schrodinger wave equation for a particle in a potential well of infinite depth and for free particle.

Module - 2	Hours - 10

Electrical Properties of Materials

Free–electron concept (Drift velocity, Thermal velocity, Mean collision time, Mean free path, relaxation time). Failure of classical free electron theory. Quantum free electron theory, Assumptions, Fermi factor, density of states (qualitative only) Fermi–Dirac Statistics. Expression for electrical conductivity based on quantum free electron theory, Merits of quantum free electron theory.

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Conductivity of Semi conducting materials, Concentration of electrons and holes in intrinsic semiconductors, law of mass action.

Temperature dependence of resistivity in metals and superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors–Temperature dependence of critical field. BCS theory (qualitative). High temperature superconductors. Applications of superconductors –. Maglev vehicles.

Module - 3   Hours - 10

Lasers and Optical Fibers

Einstein's coefficients (expression for energy density). Requisites of a Laser system. Condition for laser action. Principle, Construction and working of CO_2 laser and semiconductor Laser. Applications of Laser – Laser welding, cutting and drilling. Measurement of atmospheric pollutants. Holography–Principle of Recording and reconstruction of images.

Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation, Block diagram discussion of point to point communication, applications.

Module - 4   Hours - 10

Crystal Structure

Space lattice, Bravais lattice–Unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal. Miller indices. Expression for inter – planar spacing. Co-ordination number. Atomic packing factors (SC,FCC,BCC). Bragg's law, Determination of crystal structure using Bragg's X–ray difractometer. Polymarphism and Allotropy. Crystal Structure of Diamond, qualitative discussion of Pervoskites.

Module - 5   Hours - 10

Shock waves and Science of Nano Materials

Definition of Mach number, distinctions between- acoustic, ultrasonic, subsonic and supersonic waves. Description of a shock wave and its applications. Basics of conservation of mass, momentum and energy. Normal shock equations (Rankine-Hugonit equations). Method of creating shock waves in the laboratory using a shock tube, description of hand operated Reddy shock tube and its characteristics.

Introduction to Nano Science, Density of states in 1D, 2D and 3D structures. Synthesis : Top–down and Bottom–up approach, Ball Milling and Sol–Gel methods.

CNT – Properties, synthesis: Arc discharge, Pyrolysis methods, Applications.

Scanning Electron microscope: Principle, working and applications.

Course outcomes:

On Completion of this course, students are able to –

* Learn and understand more about basic principles and to develop problem solving skills and implementation in technology.
* Gain Knowledge about Modern physics and quantum mechanics will update the basic concepts to implement the skills.
* Study of material properties and their applications is the prime role to understand and use in engineering applications and studies.
* Study Lasers and Optical fibers and its applications are to import knowledge and to develop skills and to use modern instruments in the engineering applications.
* Understand Crystal structure and applications are to boost the technical skills and its applications.
* Expose shock waves concept and its applications will bring latest technology to the students at the first year level to develop research orientation programs at higher semester level.
* Understand basic concepts of nano science and technology.

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Wiley precise Text, **Engineering Physics,** Wiley India Private Ltd., NewDelhi. Book series – 2014,
2. Dr. M.N. Avadhanulu, Dr. P.G.Kshirsagar, **Text Book of Engineering Physics,** S Chand Publishing, New Delhi - 2012

Reference Books:

1. S.O.Pillai, **Solid State Physics, New** Age International. Sixth Edition.
2. Chintoo S Kumar, K Takayana and K P J Reddy, **Shock waves made simple,** Willey India Pvt. Ltd. New Delhi, 2014
3. A Marikani, **Engineering Physics,** PHI Learning Private Limited, Delhi - 2013
4. Prof. S. P. Basavaraju, **Engineering Physics,** Subhas Stores, Bangalore-2
5. V Rajendran ,**Engineering Physics**, Tata Mc.Graw Hill Company Ltd., New Delhi - 2012
6. S Mani Naidu, **Engineering Physics,** Pearson India Limited - 2014

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ELEMENTS OF CIVIL ENGINEERING AND MECHANICS

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	17CIV13/17CIV23	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course Objectives:

The The objectives of this course is to make students to learn basics of Civil Engineering concepts and infrastructure development, solve problems involving Forces, loads and Moments and know their applications in allied subjects. It is a pre-requisite for several courses involving Forces, Moments, Centroids, Moment of inertia and Kinematics.

Particulars

Module - 1

Introduction to Civil Engineering &Engineering Mechanics

Introduction to Civil Engineering

BScope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, WaterResources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.

1 - Hours

Infrastructure: Types of infrastructure, Role of Civil Engineer in theInfrastructural Development, Effect of the infrastructural facilities onsocio-economic development of a country.

1 - Hours

Roads: Classification of Roads and their functions, Comparison of Flexible and Rigid Pavements (Advantages and Limitations)

1 - Hours

Bridges: Types of Bridges and Culverts, RCC, Steel and Composite Bridges

1 - Hours

Dams: Different types of Dams based on Material, Structural behavior and functionality with simple sketches.

1 - Hours

Introduction to Engineering Mechanics:

Basic idealizations - Particle, Continuum and Rigid body; Newton's laws☐Force and its characteristics, types of forces-Gravity, Lateral and its distribution on surfaces, Classification of force systems, Principle of physical independence, superposition, transmissibility of forces, , Introduction to SI units.

2 - Hours

Couple, Moment of a couple, Characteristics of couple, Moment of a force, Equivalent force - Couple system; Numerical problems on moment of forces and couples, on equivalent force - couple system.

3 - Hours

Module - 2

Analysis of Concurrent Force Systems
Concepts: Resultants and Equilibrium

Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Parallelogram Law of forces, Principle of resolved parts;

3 - Hours

Numerical problems on composition of coplanar concurrent force systems. Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent and non-concurrent force systems.

3 - Hours

Application- Static Friction in rigid bodies in contact

2 - Hours

Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Numerical Problems on single and two blocks on inclined planes

2 - Hours

Module - 3

Analysis of Non-Concurrent Force Systems
Concepts: Resultants and Equilibrium

Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent Force system.

5 - Hours

Application-Support Reaction in beams

Types of Loads and Supports, statically determinate beams, Numerical problems onsupport reactions for statically determinate beams with Point load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments.

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<h1 style="text-align:center">Module - 4</h1>

Centroids and Moments of Inertia of Engineering Sections:

Centroids

Introduction to the concept, centroid of line and area, centroid of basic geometrical figures, computing centroid for– T, L, I, Z and full/quadrant circular sections and their built up sections. Numerical problems

5 - Hours

Moment of Inertia

Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of basic planar figures, computing moment of Inertia for – T, L, I, Z and full/quadrant circular sections and their built up sections. Numerical problems

5 - Hours

<h1 style="text-align:center">Module - 5</h1>

Kinematics

Concepts and Applications

Definitions – Displacement – Average velocity – Instantaneous velocity – Speed – Acceleration - Average acceleration – Variable acceleration – Acceleration due to gravity – Newton's Laws of Motion.

2 - Hours

Rectilinear Motion–Numerical problems

2 - Hours

Curvilinear Motion – Super elevation – ProjectileMotion – Relative motion – Numerical problems.

3 - Hours

Motion under gravity – Numerical problems.

3 - Hours

COURSE OUTCOMES

After a successful completion of the course, the student will be able to:

1. Know basics of Civil Engineering, its scope of study, knowledge about Roads, Bridges and Dams;
2. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies;
3. Compute the reactive forces and the effects that develop as a result of the external loads;
4. Locate the Centroid and compute the Moment of Inertia of regular cross-sections.
5. Express the relationship between the motion of bodies and
6. Equipped to pursue studies in allied courses in Mechanics.

Question Paper Pattern:
- * 10 Questions are to be set such that 2 questions are selected from each module.
- * 2 Questions are to be set under respective modules.
- * Intra module questions are to be set such that the questions should cover the entire module and further, should be answerable for the set marks.
- * Each question should be set for 20 marks (Preferably 10 marks each)
- * Not more than 3 sub questions are to be set under any main question
- * Students should answer 5 full questions selecting at least 1 from each module.

TEXT BOOKS

1. Elements of Civil Engineering and Engineering Mechanics by M.N. Shesha Prakash and Ganesh. B. Mogaveer, PHI Learning, 3rd Revised edition (2014)
2. Engineering Mechanics-Statics and Dynamics by A Nelson, Tata McGraw Hill Education Private Ltd, New Delhi, 2009.
3. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, New Age International Publisher, New Delhi, 3rd edition 2009.

REFERENCES

1. Engineering Mechanics by S.Timoshenko,D.H.Young, and J.V.Rao, TATA McGraw-Hill Book Company, New Delhi
2. Beer FP and Johnson ER, **"Mechanics for Engineers- Dynamics and Statics"**- 3rd SI Metric edition, Tata McGraw Hill. - 2008
3. Shames IH, **"Engineering Mechanics – Statics & Dynamics"**- PHI – 2009.

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PROGRAMMING IN C AND DATA STRUCTURES

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	17PCD13/17PCD23	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course Objectives:

The objectives of this course is to make students to learn basic principles of Problem solving, implementing through C programming language and to design & develop programming skills. To gain knowledge of data structures and their applications.

Module - 1

INTRODUCTION TO C LANGUAGE

Introduction to Civil Engineering

Pseudo code solution to problem, Basic concepts in a C program, Declaration, Assignment & Print statements, Data Types, operators and expressions etc, Programming examples and exercise.

Text 1: Chapter 2, and Text 2: 1.1, 1.2, 1.3

10 - Hours

Module - 2

BRANCHING AND LOOPING

Two way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises.

Text 1: Chapter 3.   &   Text 2: 4.4.

10 - Hours

Module - 3

FUNCTIONS, ARRAYS AND STRINGS

ARRAYS AND STRINGS

Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises.

Text 1: 5.7, & **Text 2** : 7.3, 7.4, chapter 9

10 - Hours

Module - 1
INTRODUCTION TO C LANGUAGE
Introduction to Civil Engineering

Pseudo code solution to problem, Basic concepts in a C program, Declaration, Assignment & Print statements, Data Types, operators and expressions etc, Programming examples and exercise.

Text 1: Chapter 2, **and** **Text 2:** 1.1, 1.2, 1.3

10 - Hours

Module - 2
BRANCHING AND LOOPING

Two way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises.

Text 1: Chapter 3. & **Text 2:** 4.4.

10 - Hours

Module - 3
FUNCTIONS, ARRAYS AND STRINGS
ARRAYS AND STRINGS

Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises.

Text 1: 5.7, & **Text 2:** 7.3, 7.4, chapter 9

10 - Hours

FUNCTIONS: Functions in C, Argument Passing – call by value, call by reference, Functions and program structure, location of functions, void and parameter less Functions, Recursion, Programming examples and exercises.

Text 1: 1.7, 1.8, Chapter 4. **Text 2:** 5.1 to 5.4

Module - 4
STRUCTURES AND FILE MANAGEMENT

Basic of structures, structures and Functions, Array of structures, structure Data types, type definition, Defining, opening and closing of files, Input and output operations, Programming examples and exercises.

Text 1: 6.1 to 6.3. **Text 2:** 10.1 to 10.4, Chapter 11.

10 - Hours

Module - 5
POINTERS AND PREPROCESSORS & Data Structures

Pointers and address, pointers and functions (call by reference) arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer ,Initialization of pointer arrays, Dynamic memory

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allocations methods, Introduction to Preprocessors, compiler control Directives, Programming examples and exercises.

Text 1: 5.1 to 5.6, 5.8.   Text 2: 12.2, 12.3, 13.1 to 13.7.

10 - Hours

Introduction to Data Structures: Primitive and non primitive data types, Abstract data types, Definition and applications of Stacks, Queues, Linked Lists and Trees.

Text 2 : 14.1, 14.2, 14.11, 14.12, 14.13, 14.15, 14.16, 14.17, 15.1.

Course outcomes:

On completion of this course, students are able to

* Achieve Knowledge of design and development of C problem solving skills.
* Understand the basic principles of Programming in C language
* Design and develop modular programming skills.
* Effective utilization of memory using pointer technology
* Understands the basic concepts of pointers and data structures.

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be 2 full questions (with a **maximum of four** sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, 2nd Edition, PHI, 2012.
2. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1st Edition, Pearson 2011.

Reference Books:

1. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
2. R S Bichkar, Programming with C, University Press, 2012.
3. V Rajaraman: Computer Programming in C, PHI, 2013.

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COMPUTER AIDED ENGINEERING DRAWING

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17CED14/17CED24	CIE Marks	:	40
Number of Lecture Hours/Week	:	6 (2T + 4L)	SEE Marks	:	60
Total Number of Lecture Hours	:	84	Exam Hours	:	03

CREDITS - 04

Course Objectives:

Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.

The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

Module - 1
Introduction to Computer Aided Sketching

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. of HP, VP, RPP & LPP. of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.

06 - Hours

Module - 2
Orthographic projections

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems).

Orthographic Projections of Plane Surfaces (First Angle Projection Only)

Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates).

20 - Hours

Module - 3

Projections of Solids (First angle Projection only)

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).

28 - Hours

Module - 4

Sections And Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on sections of solids) Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).

15 - Hours

Module - 5

Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids).

15 - Hours

Course outcomes:

After studying this course,
1. Students will be able to demonstrate the usage of CAD software.
2. Students will be able to visualize and draw Orthographic projections, Sections of solids and Isometric views of solids.
3. Students are evaluated for their ability in applying various concepts to solve practical problems related to engineering drawing.

Question paper pattern:

Scheme of Examination
1. Module 1 is only for practice and Internal Assessment and not for Examination.
2. Question paper for each batch of students will be sent online by VTU and has to be downloaded before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the Internal and External examiners.

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3. A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules)

Q. No.	From Modules	Marks allotted
1.	Module 2	30
2.	Module 3	40
3.	Module 4 or Module 5	30
	Total	100

Scheme of Evaluation

Q. No.	Solutions & Sketching on graph book	Computer display and printout	Total Marks
1.	10 Marks	20 Marks	30
2.	15 Marks	25 Marks	40
3.	15 Marks	15 Marks	30
Total	40 Marks	60 Marks	100

Students have to submit the computer printouts and the sketches drawn on the graph sheets at the end of the examination. Both Internal and External examiners have to jointly evaluate the solutions (Sketches), Computer display and Printouts of each student for 100 Marks (40 Marks for solutions & sketches + 60 Marks for computer display and printouts). Submit the marks list along with the solution (sketches) on graph sheets and computer printouts in separate covers.

4. Each batch must consist of a minimum of 10 students and a maximum of 12 students

5. Examination can be conducted in parallel batches, if necessary.

Text Books:

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.

2. "Computer Aided Engineering Drawing" by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers.

Reference Books:

1) Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt..Ltd., New Delhi, 3rd revised edition- 2006.

2) Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

3) Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.

4) A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.   ****

ELEMENTS OF MECHANICAL ENGINEERING
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Course Code	:	17EME14/17EME24	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

CREDITS - 04

Course Objectives:
Students belonging to all branches of Engineering are made to learn certain fundamental topics related to mechanical engineering so that they will have a minimum understanding of mechanical systems, equipment and process.

Module - 1
Energy Resources : Non-renewable and renewable energy resources, **Petroleum based solid,** liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels, **Solar Power :** Solar Radiation.

Solar constant (definition only), Solar Thermal energy harvesting, ex: liquid flat plate collectors, solar ponds (principle of operation only), Solar photovoltaic principle. **WindPower** : principle of operation of a typical windmill. **Hydro Power** : Principles of electric power generation from hydropowerplants, **Nuclear Power** : Principles of Nuclear power plants, **Bio Fuels** : introduction to bio fuels, examples of various biofuels used in engineering applications, Comparison of biofuels with petroleum fuels in terms of calorific value and emission. **Steam Formation and Properties :**

Classification of boilers, Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and accessories (No sketches for mountings and accessories), wet steam, saturated and superheated steam, specific volume, enthalpy andinternal energy. (No numerical problems in this module)

10 - Hours
Module - 2
Turbines and IC Engines and Pumps Steam turbines :
Classification, Principle of operation of Impulse and reaction turbines, Delaval's turbine, Parson's turbine. (No compounding of turbines).

Gas turbines : Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.
Water turbines : Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine

Internal Combustion Engines : Classification, I.C. Engines parts, 2 Stroke and 4 stroke Petrol engines, 4 stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency, and specific fuel consumption, [numericals on IC Engines].

10 - Hours

Module - 3

Machine Tools and Automation Machine Tools Operations :

Turning, facing, knurling, Thread cutting, Taper Turning by swivelling the compound rest, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plane milling, End milling, Slot milling. (No sketches of Machine tools, sketches to be used only for explaining operations. Students to be shown the available machine tools in the Machine Shop of the college before explaining the operations)

Robotics and Automation :

Robotics : Introduction, classification based on robots configuration; Polar, cylindrical, Cartesian Coordinate and spherical. Application, Advantages, and disadvantages

Automation : Definition, types –Fixed, Programmable & Flexible automation, NC/ CNC machines: Basic elements with simple block diagrams, advantages and disadvantages.

10 - Hours

Module - 4

Engineering materials and joining processes :

Engineering Materials : Types and applications of Ferrous & Nonferrous metals and alloys,

Composites : Introduction: Definition, Classification and applications (Air craft and Automobiles)

Soldering, Brazing and Welding :

Definitions, classification and method of soldering, Brazing and welding. Differences between soldering, Brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding.

10 - Hours

Module - 5

Refrigeration, Air-Conditioning :

Refrigerants : properties of refrigerants, list of commonly used refrigerants. Refrigeration –Definitions – Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapor compression refrigeration and vapour absorption refrigeration: Principles and applications of air conditioners, Room air conditioner.

Course outcomes :

Students shall demonstrate knowledge associated with,

1. Various Energy sources, Boilers, Prime movers such as turbines and IC engines, refrigeration and air-conditioning systems
2. Metal removal process using Lathe, drilling, Milling Robotics and Automation.
3. Fair understanding of application and usage of various engineering materials.

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be 2 full questions(with a **maximum** of **four** sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module. from each module.
* Each full question will have sub questions covering all the topics under a module.

Text Books:

1. V.K.Manglik, "Elements of Mechanical Engineering", PHI Publications, 2013. (Module-1,2,4,5)
2. MikellP.Groover, "Automation, Production Systems & CIM", 3rd Edition, PHI (Module -3)
3. K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore. (Module -1,2,3,4,5)

Reference Books:

1. S.TrymbakaMurthy, "A Text Book of Elements of Mechanical Engineering", 4th Edition 2006, Universities Press (India) Pvt Ltd, Hyderabad.
2. K.P.Roy, S.K.HajraChoudhury, Nirjhar Roy, "Elements of Mechanical Engineering", Media Promoters & Publishers Pvt Ltd,Mumbai,7th Edition, 2012
3. Pravin Kumar, "Basic Mechanical Engineering", 2013 Edition, Pearson.

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BASIC ELECTRICAL ENGINEERING

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17ELE15/17ELE25	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

CREDITS - 04

Course Objectives:

* Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
* Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
* Develop selection skill to identify the type of generators or motors required for particular application.
* Highlight the importance of transformers in transmission and distribution of electric power.
* Emphasize the effects of electric shock and precautionary measures.
* Improve the ability to function on multi-disciplinary teams.

Module - 1

D C circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. Illustrative examples.

5 - Hours

Electromagnetism:

Review of field around a conductor and coil, magnetic flux and flux density, magnetomotive force and magnetic field intensity, reluctance and permeability, definition of magnetic circuit and basic analogy between electric and magnetic circuits. (These topics are not to be considered for setting the examination questions).

Electromagnetic induction: Definition of Electromagnetic Induction, Faradays Laws, Fleming's right hand rule, Lenz's Law, Statically and dynamically induced emf. Self-inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic field. Illustrative examples. Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule.

5 - Hours

Module - 2

DC Machines:

Working principle of DC machine as a generator and a motor. Types and constructional features. Types of armature windings, Emf equation of generator, relation between induced emf and terminal voltage with a mention of brush contact drop and drop due to armature reaction. Illustrative examples, neglecting armature reaction.

Operation of DC motor, back emf, torque equation. Types of DC motors, characteristics and applications. Significance of back emf. Necessity of a starter for DC motor. Illustrative examples on back emf and torque.

7 - Hours

Measuring Instruments: Construction and Principle of operation of dynamometer type wattmeter and single phase induction type energy meter.

3 - Hours

Module - 3

Single-phase AC circuits:

Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying quantities, phasor representation of alternating quantities. Analysis, with phasor diagrams, of R, L, C, R-L, R-C and R-L-C circuits and, parallel and series- parallel circuits. Real power, reactive power, apparent power and power factor. Illustrative examples.

7 - Hours

Domestic wiring:

Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock, Objectives of Earthing, types of earthing; pipe and plate earthing, Residual current circuit breaker (RCCB).

3 - Hours

Module - 4

Three Phase Circuits:

Necessity and advantages of three phase systems, generation of three phase power. Definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced three-phase circuits, measurement of power by two-wattmeter method. Determination power factor using wattmeter readings. Illustrative examples.

6 - Hours

Three PhaseSynchronous Generators:

Principle of operation, Types and constructional features, Advantages of rotating field type alternator, Synchronous speed, Frequency of generated voltage, Emf equation. Concept of winding factor (excluding the derivation of distribution and pitch factors). Illustrative examples on calculation of distribution factor, pitch factor and emf equation.

4 - Hours

Module - 5

Single Phase Transformers:

Necessity of transformer, Principle of operation and construction of single-phase transformers (core and shell types). Emf equation, losses, variation losses with respect to load, efficiency, Condition for maximum efficiency, Voltage regulation and its significance (Open Circuit and Short circuit tests, equivalent circuit and phasor diagrams are excluded). Illustrative problems on emf equation and efficiency only.

6 - Hours

Three Phase Induction Motors:

Principle of operation, Concept and production of rotating magnetic field, Synchronous speed, rotor speed, Slip, Frequency of the rotor induced emf, Types and Constructional features. Slip and its significance. Applications of squirrel - cage and slip - ring motors. Necessity of a starter, starting of motor using stars-delta starter. Illustrative examples on slip calculations.

4 - Hours

Course outcomes:

After the completion of the course, the student should be able
   * To predict the behaviour of electrical and magnetic circuits.
   * Select the type of generator / motor required for a particular application.
   * Realize the requirement of transformers in transmission and distribution of electric power and other applications.
   * Practice Electrical Safety Rules & standards.
   * To function on multi-disciplinary teams.

Question paper pattern:
   * The question paper will have ten questions.
   * Each full Question consisting of 20 marks
   * There will be 2 full questions (with a **maximum** of **four** sub questions) from each module.
   * Each full question will have sub questions covering all the topics under a module.
   * The students will have to answer 5 full questions, selecting one full question from each module.

Text Books

1 Basic Electrical Engineering, D. C. Kulshreshtha, TMH, 1st Edition, Revised.

2 Electrical Technology, Edward Hughes, Pearson, 10th Edition, 2014

Reference Books

1 Fundamentals of Electrical Engineering, Rajendra Prasad PHI Third Edition 2014.

2 Basic Electrical Engineering, Abhijit, Chakrabarti, ChandanKumar, Chanda, Sudiptanath, TMH, 1st Edition, 2010

3 Fundamentals of Electrical Engineering and Electronics, B. L. Theraja, S.Chand & Company Ltd, Reprint Edition 2013

BASIC ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17ELN15/17ELN25	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

CREDITS - 04

Course Objectives:

The course objective is to make students of all the branches of Engineering to understand the efficacy of Electronic principles which are pervasive in engineering applications

Module - 1

Semiconductor Diodes and Applications (Text-1): p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit (only qualitative approch), Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator. Numerical examples as applicable.

06 - Hours

Bipolar Junction Transistors:

BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable.

04 - Hours

Module - 2

BJT Biasing (Text-1):

DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable.

04 - Hours

Introduction to Operational Amplifiers (Text-2): Ideal OPAMP, Inverting and Non Inverting OPAMP circuits, OPAMP applications: voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable.

06 - Hours

Module - 3

Digital Electronics (Text-2): Introduction, Switching and Logic Levels, Digital Waveform (Sections 9.1to 9.3). Number Systems: Decimal Number

System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers. Boolean Algebra Theorems, De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. Algebraic Simplification, NAND and NOR Implementation (Sections 11.7 and 11.8): NAND Implementation, NOR Implementation. Half adder, Full adder.

10 - Hours

Module - 4

Flip-Flops (Text-2): Introduction to Flip-Flops (Section 12.1), NAND Gate Latch/ NOR Gate Latch, RS Flip-Flop, Gated Flip-Flops: Clocked RS Flip-Flop (Sections 12.3 to 12.5).

05 - Hours

Microcontrollers (Ref.1): Introduction to Microcontrollers, 8051 Microcontroller Architecture and an example of Microcontroller based stepper motor control system (only Block Diagram approach).

05 - Hours

Module - 5

Communication Systems (Text-2): Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation. Amplitude and Frequency Modulation: A comparison.

06 - Hours

Transducers (Text-2): Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor. Linear Variable Differential Transformer (LVDT). Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer.

04 - Hours

Course outcomes:
After studying this course, students will be able to:
*   Appreciate the significance of electronics in different applications,
*   Understand the applications of diode in rectifiers, filter circuits and wave shaping,
*   Apply the concept of diode in rectifiers, filters circuits
*   Design simple circuits like amplifiers (inverting and non inverting), comparators, adders, integrator and differentiator using OPAMPS,
*   Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates, and

* Understand the functioning of a communication system, and different modulation technologies, and
* Understand the basic principles of different types of Transuducers.

Question paper pattern:
* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be **2 full** questions(with a **maximum** of **four** sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
1. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 5th Edition, 2008.
2. D.P. Kothari, I. J. Nagrath, **"Basic Electronics"**, McGraw Hill Education (India) Private Limited, 2014.

Reference Books: MuhammadAli Mazidi, **"The 8051 Microcontroller and Embedded. Systems. Using Assembly and C."** Second Edition, 2011, Pearson India.

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COMPUTER PROGRAMMING LABORATORY
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Laboratory Code	:	17CPL16/17CPL26	CIE Marks	:	40
Number of Lecture Hours/Week	:	01Hr Tutorial (Instructions) + 02 Hours Laboratory	SEE Marks	:	60
Total Number of Lecture Hours	:	48	Exam Hours	:	03

CREDITS - 02

Course Objectives:
To provide basic principles C programming language. To provide design & develop of C programming skills. To provide practical exposures like designing flowcharts, algorithms, how to debug programs etc.

Descriptions (if any):
Demonstration of Personal Computer and its Accessories: Demonstration and Explanation on Disassembly and Assembly of a Personal Computer by the faculty-in-charge. Students have to prepare a write-up on the same and include it in the Lab record and evaluated.

Laboratory Session-1: Write-up on Functional block diagram of Computer, CPU, Buses, Mother Board, Chip sets, Operating System & types of OS, Basics of Networking & Topology and NIC.

Laboratory Session-2: Write-up on RAM, SDRAM, FLASH memory, Hard disks, Optical media, CD-ROM/R/RW, DVDs, Flash drives, Keyboard, Mouse, Printers and Plotters. Introduction to flowchart, algorithm and pseudo code.

Note: These TWO Laboratory sessions are used to fill the gap between theory classes and practical sessions. Both sessions are to be evaluated as lab experiments.

Laboratory Experiments:
Implement the following programs with WINDOWS / LINUX platform using appropriate C compiler.
1. Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation $(ax2+bx+c=0)$ as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

2. Design and develop an algorithm to find the reverse of an integer number NUM and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: 2014, Reverse: 4102, Not a Palindrome

3. 3a. Design and develop a flowchart to find the square root of a given number N. Implement a C program for the same and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n).

   3b. Design and develop a C program to read a year as an input and find whether it is leap year or not. Also consider end of the centuries.

4. Design and develop an algorithm to evaluate polynomial $f(x) = a4x4 + a3x3 + a2x2 + a1x + a0$, for a given value of x and its coefficients using Horner's method. Implement a C program for the same and execute the program with different set of values of coefficients and x.

5. Draw the flowchart and Write a C Program to compute $Sin(x)$ using Taylor series approximation given by $Sin(x) = x - (x3/3!) + (x5/5!) - (x7/7!) + \ldots$

   Compare your result with the built- in Library function. Print both the results with appropriate messages.

6. Develop an algorithm, implement and execute a C program that reads N integer numbers and arrange them in ascending order using **Bubble Sort.**

7. Develop, implement and execute a C program that reads two matrices A **(m x n)** and B **(p x q)** and Compute product of matrices A and B. Read matrix A and matrix B in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.

8. Develop, implement and execute a C program to search a Name in a list of names using Binary searching Technique.

9. Write and execute a C program that

   i.   Implements string copy operation STRCOPY(str1,str2) that copies a stringtr1 to   another string str2 without using library function.

   ii.   Read a sentence and print frequency of vowels and total count of consonants.

10. a. Design and develop a C function **RightShift(x ,n)** that takes two integers x and n as input and returns value of the integer x rotated to the right by n positions. Assume the integers are unsigned. Write a C program that invokes this function with different values for x and n and tabulate the results with suitable headings.

b. Design and develop a C function **isprime**(num) that accepts an integer argument and returns 1 if the argument is prime, a 0 otherwise. Write a C program that invokes this function to generate prime numbers between the given range.

11. Draw the flowchart and write a **recursive C** function to find the factorial of a number, n!, defined by fact(n)=1, if n=0. Otherwise fact(n)=n*fact(n-1). Using this function, write a C program to compute the binomial coefficient nCr. Tabulate the results for different values of n and r with suitable messages.

12. Given two university information files **"studentname.txt"** and **"usn.txt"** that contains students Name and USN respectively. Write a C program to create a new file called "output.txt" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence. shown below . Display the contents of output file "output.txt" on to the screen.

Student Name	USN	← Heading
Name 1	USN1	
Name 2	USN2	
....	....	
....	....	

13. Write a C program to maintain a record of n student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Assume appropriate data type for each field. Print the marks of the student, given the student name as input.

14. Write a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.

Course outcomes:
*   Gaining Knowledge on various parts of a computer.
*   Able to draw flowcharts and write algorithms
*   Able design and development of C problem solving skills.
*   Able design and develop modular programming skills.
*   Able to trace and debug a program

Conduction of Practical Examination:
1. All laboratory experiments (nos) are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
4. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

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WORKSHOP PRACTICE

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	17WSL16/17WSL26	CIE Marks	40
Number of Lecture Hours/Week	3 (1 hr Tut +2 hrs lab)	SEE Marks	60
Total Number of Lecture Hours	42	Exam Hours	03

CREDITS - 02

Course Objectives:

* To impart knowledge and skill to use tools, machines, equipment, and measuring instruments.
* Educate students of Safe handling of machines and tools.

Module - 1

1. Use of Hand Tools: V-block, Marking Gauge, Files, Hack Saw, Drills, Taps and Minimum 3 models involving Dove tail joint, Triangular joint and Semicircular joint.
2. Welding: Study of electric arc welding tools &equipments, Models: Butt Joint, Lap Joint, T joint & L-joint.
3. Sheet Metal & Soldering Work: Development & Soldering of the models: Tray, Frustum of cone, Prism(Hexagon & Pentagon),Truncated Square Pyramid, Funnel.
4. Study & Demonstration of power tools in Mechanical Engineering.

03 - Hours

Course outcomes :

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

1. Demonstrate and produce different types of fitting models.
2. Gain knowledge of development of sheet metal models with an understanding of their applications.
3. Perform soldering and welding of different sheet metal & welded joints.
4. Understand the Basics of Workshop practices.

Scheme of Examination

Fitting Model / Sheet Metal Work: 50 Marks

(50% of the batch to be given Fitting and remaining 50% to be given Sheet metal work including Soldering)

Welding: 30 Marks

Viva voce: 20 Marks

Total: 100 Marks

Ref Books: Elements of Workshop Technology:Vol I : Manufacturing Processes, S K Hajra. Choudhury, A K. Hajra Choudhury, 15th Edition Reprinted 2013,Media Promoters &Publishers Pvt Ltd., Mumbai.

Note: No mini drafters and drawing boards required. Drawings (Developments) can be done on sketch sheets using scale , pencil and Geometrical Instruments

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ENGINEERING CHEMISTRY LABORATORY

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17CHEL17/17CHEL27	CIE Marks	:	40
Number of Lecture Hours/Week : 3 (1 hr Tutorial +2 hrs lab)			SEE Marks	:	60
Total Number of Lecture Hours :		50	Exam Hours	:	03

CREDITS - 02

Course Objectives:

* To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments

1. Estimation of FAS potentiometrically using standard $K_2Cr_2O_7$ solution.
2. Estimation of Copper colorimetrically.
3. Estimation of Acids in acid mixture conductometrically.
4. Determination of pKa of weak acid using pH meter.
5. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
6. Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.

Volumetric Experiments

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by External Indicator method.
5. Estimation of Alkalinity (OH-, CO3-- & HCO3-) of water using standard HCl solution.
6. Determination of COD of waste water.

Course outcomes:

On completion of this course, students will have the knowledge in,

* Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results, and

* Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results

Conduction of Practical Examination:

1. All experiments are to be included for practical examination.
2. One instrumental and another volumetric experiments shall be set.
3. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference Books:

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney, **"Vogel's Text Book of Quantitative Chemical Analysis"**
2. O.P.Vermani & Narula, **"Theory and Practice in Applied Chemistry"**, New Age International Publisers.
3. Gary D. Christian, **"Analytical chemistry"**, 6th Edition, Wiley India.

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ENGINEERING PHYSICS LAB

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17PHYL17/17PHYL27	CIE Marks	:	40
Number of Lecture Hours/Week : 3 (1 hr Tutorial +2 hrs lab)			SEE Marks	:	60
Total Number of Lecture Hours :		48	Exam Hours	:	03

CREDITS - 02

Course Objectives:

* The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies. To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipments.

* Design of circuits using new technology and latest components and to develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.

EXPERIMENTS:

1. Black box experiment; Identification of unknown passive electrical components and determine the value of Inductance and Capacitance

2. Series and parallel LCR Circuits (Determination of resonant frequency and quality factor)

3. I–V Characteristics of Zener Diode. (determination of knee voltage, zener voltage and forward resistance)

4. Characteristics of Transistor (Study of Input and Output characteristics and calculation of input resistance, output resistance and amplification factor)

5. Photo Diode Characteristics (Study of I–V characteristics in reverse bias and variation of photocurrent as a function of reverse voltage and intensity).

6. Dielectric constant (Measurement of dielectric constant).

7. Diffraction (Measurement of wavelength of laser source using diffraction grating).

8. Torsional pendulum (Determination of M.I. of wire and Rigidity modulus).

9. Determination of Fermi energy. (Measurement of Fermi energy in copper).

10. Uniform Bending Experiment (Determination of Youngs modulus of material bar).

11. Newtons Rings, (Determination of radius of curvature of plano convex lens).
12. Verification of Stefan's Law.

Course Outcomes:

On Completion of this course, students are able to –

* Develop skills to impart practical knowledge in real time solution.
* Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
* Design new instruments with practical knowledge.
* Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
* Understand measurement technology, usage of new instruments and real time applications in engineering studies.

Note: 1) All the above twelve experiments are to be conducted

2) Two experiments are to be performed by the students in the examination

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ENVIRONMENTAL STUDIES

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Course Code	:	17CIV18/17CIV28	:	CIE Marks	40
Number of Lecture Hours/Week	:	02	:	SEE Marks	60
Total Number of Lecture Hours	:	25	:	Exam Hours	03

Course Objectives:

1. To identify the major challenges in environmental issues and evaluate possible solutions.
2. Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.
3. To analyze an overall impact of specific issues and develop environmental management plan.

Module - 1

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security.

02 - Hours

Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment, Sustainable Development.

03 - Hour

Module - 2

Natural Resources, Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle.

03 - Hours

Energy – Different types of energy, Conventional sources & Non Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.

03 - Hours

Module - 3

Environmental Pollution – Water Pollution, Noise pollution, Land Pollution, Public Health Aspects.

02 - Hours

Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management.

03 - Hours

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Module - 4

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures.

03 - Hours

Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods.

02 - Hours

Module - 5

Introduction to GIS & Remote sensing, Applications of GIS & Remote Sensing in Environmental Engineering Practices.

02 - Hours

Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education & Women Education.

03 - Hours

Course Outcome:

Students will be able to,

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment,
3. Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues

Text Books:

1. Benny Joseph (2005), **"Environmental Studies"**, Tata McGraw – Hill Publishing Company Limited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), **"Environmental Studies"**, Wiley   India Private Ltd., New Delhi.
3. R Rajagopalan, **"Environmental Studies – From Crisis to Cure"**, Oxford University   Press, 2005,
4. Aloka Debi, **"Environmental Science and Engineering"**, Universities Press (India) Pvt. Ltd. 2012.

Reference Books:

1. Raman Sivakumar, **"Principals of Environmental Science and Engineering"**, Second   Edition, Cengage learning Singapore, 2005
2. P. Meenakshi, **"Elements of Environmental Science and Engineering"**, Prentice Hall of India Private Limited, New Delhi, 2006
3. S.M. Prakash, **"Environmental Studies"**, Elite Publishers Mangalore, 2007

4. Erach Bharucha, **"Text Book of Environmental Studies"**, for   UGC, University press, 2005
5. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Tenth Edition, Thomson Brooks /Cole, 2004
6. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Eleventh   Edition, Thomson Brooks /Cole, 2006
7. Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush Malaviya, **"Text Book of Environmental and Ecology"**, Acme Learning Pvt. Ltd. New Delhi.

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ENGINEERING MATHEMATICS-II

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - II

Course Code	: 17MAT21	CIE Marks	:	40
Number of Lecture Hours/Week	: 04	SEE Marks	:	60
Total Number of Lecture Hours	: 50	Exam Hours	:	03

CREDITS - 04

Course Objectives:

* To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following'
* Ordinary differential equations
* Partial differential equations
* Double and triple integration
* Laplace transform

Module - 1

Linear differential equations with constant coefficients:

Solutions of second and higher order differential equations - inverse differential operator method, method of undetermined coefficients and method of variation of parameters.

10 - Hours

Module - 2

Differential equations-2:

Linear differential equations with variable coefficients: Solution of Cauchy's and Legendre's linear differential equations.

Nonlinear differential equations - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairauit's equations and equations reducible to Clairauit's form.

10 - Hours

Module - 3

Partial Differential equations:

Formulation of Partial differential equations by elimination of arbitrary constants/functions, solution of non-homogeneous Partial differential equations by direct integration, solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only.

Derivation of one dimensional heat and wave equations and their solutions by variable separable method.

10 - Hours

Module - 4

Integral Calculus:

Double and triple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Application of double and triple integrals to find area and volume. **Beta and Gamma functions:** definitions, Relation between beta and gamma functions and simple problems.

10 - Hours

Module - 5

Laplace Transform

Definition and Laplace transforms of elementary functions. Laplace transforms of $e^{at}f(t)$, $t^n f(t)$ and $\frac{f(t)}{t}$ (without proof), periodic functions and unit-step function- problems

Inverse Laplace Transform

Inverse Laplace Transform - problems, Convolution theorem to find the inverse Laplace transforms(without proof) and problems, solution of linear differential equations using Laplace Transforms.

10 - Hours

Course outcomes:

On completion of this course, students are able to,

* solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer.
* solve partial differential equations fluid mechanics, electromagnetic theory and heat transfer.
* Evaluate double and triple integrals to find area , volume, mass and moment of inertia of plane and solid region.
* Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.
* Use Laplace transforms to determine general or complete solutions to linear ODE

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be **2** full questions(with a **maximum** of four sub questions) from each module.
* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:
* B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
* Kreyszig, "Advanced Engineering Mathematics " - Wiley, 2013

Reference Books:
* B.V.Ramana "Higher Engineering M athematics" Tata Mc Graw-Hill, 2006
* N P Bali and Manish Goyal, "A text book of Engineering mathematics" , Laxmi publications, latest edition.
* H. K Dass and Er. Rajnish Verma ,"Higher Engineerig Mathematics", S. Chand publishing,1st edition, 2011.

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Functional English

Introduction	Importance of Languages	
Grammer	Parts of Speech, Usage of Preposition and Article, Punctuation	5 Hours
Tenses & Degrees of Comparison		3 Hours
Transformation of Sentences	Active-Passive, Affirmative-Negative, Exclamatory-Assertive, Interrogative-Assertive, Kinds of sentences	5 Hours
Direct-Indirect Speech		5 Hours
Vocabulary Usage	Homonyms, Correcting Spelling, One-word equivalents	7 Hours
Precis Writing		3 Hours
Essay/Report Writing		5 Hours
Letter Writing	Personal, Official, Applications	5 Hours
Idioms & Phrases	Meaning & Usage in sentences	5 Hours
Comprehension	Of an unseen passage	2 Hours
Elaboration	Expansion of ideas, proverbs	2 Hours
Presentation	Preparation of materials and presentation - step	3 Hours

Suggested Text Books:
1) SLN Sharma & K Shankaranarayana **"Basic Grammar"**, Navakarnataka Publications.
2) Jones **"New International Business English"**, published by Cambridge University Press.

Reference Books:
1) G. Sankaran, **"English Rank Scorer"**, Addone Publishing group, Thiruvananthapuram, Kerala
2) Wren & Martin **"English Grammar"**.
3) John Seely, **"Oxford Guide to Speaking and Writing"**, 2000

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Dr. H. N. Jagannatha Reddy, BE.,ME.,Ph.d.

REGISTRAR

Ref No. VTU/Aca/A12/2017-18/4880   Date : 14 SEP 2017

NOTIFICATION

Sub: Regulations B.E/B.Tech & Scheme for 2017-18 admitted stt. *~nts and onwards
Ref: 1. Resolution No 2 of 133rd Extraordinary Executive Council Meeting, dated: 11st
        September 2017.
        2. Vice-Chancellor's order, dated 14.09.2017

    With reference to the above subject, the Scheme & Regulations governing B.E/B.Tech programme from the academic year 2017-18 has been updated on the website.

In this regard following is brought to the notice:

1.   The Course Evaluation shall be carried in the ratio 60 and 40 for SEE (Semester End Examination) and CIE (Continuous Internal Evaluation) respectively.

   - The SEE will be conducted for 100 marks and proportionally reduced to 60 marks.
   - The CIE is prescribed for maximum of 40 marks. Marks prescribed for test shall be 30 and that for assignment is 10.The CIE marks for test in a theory Course shall be based on three tests generally conducted at the end of fifth, tenth and fourteenth week of each semester. Each test shall be conducted for a maximum of 30 marks and the final marks shall be the average of three tests. The remaining 10 marks shall be awarded based on the evaluation of Assignments/Unit tests/written Quizzes that support to cover some of the Course/program outcomes. Final CIE marks awarded shall be the sum of these two out of maximum of 40 marks.
   - In the case of Practical, the CIE marks shall be based on the laboratory journals/ records (30 Marks for continuous evaluation based on conduct of experiment, viva and report writing) and one practical test (10 Marks) to be conducted at the end of the semester.

2.   The Scheme of teaching from the academic year 2017-18 admitted batch and onwards has been changed by retaining the contents of the syllabus of 2015-16 scheme as it is.

    Principals of Constituent and Affiliated Engineering Colleges are required to conduct an orientation program for the students, clearly mentioning the guidelines of Regulations & Scheme. Contents of this notification may kindly be brought to the notice of all the concerned.

By order,
Sd/-
REGISTRAR

To,
The Principals of Constituent & Affiliated Engineering Colleges.

Copy FWCs to:
1. The Vice Chancellor, through Secretary to VC, VTU, Belagavi, for information.
2. The Registrar, VTU, Belagavi, for information.
3. The Registrar (Evaluation), VTU, Belagavi, for information and needful.
4. The In-Charge Regional Director's of VTU Regional Offices at Belagavi, Bengaluru, Mysuru & Kalaburagi, for information.
5. The Special Officer, Academic Section, VTU, for information.
6. Office Superintendent, Academic Section, VTU, for information.
7. CNC to upload.