CREDIT DISTRIBUTION:

S.No		Category	Credits
A	Fo	undation Courses	48-63
	а	Humanities and Social Science (HSS)	12-15
	b	Basic Sciences (BS)	15-21
	С	Engineering Science (ES)	15-21
	d	Elective from Foundation Courses – HSS, BS and ES	6
В	Со	re Courses	63-72
С	Ele	ective Courses	27-39
	а	Programme Specific Elective	12-15
	b	Programme Specific Elective for Expanded Scope	6-12
	С	Interdisciplinary Elective	9-12
D	Pro	bject	12
E	Ski	II/Proficiency based courses (Not to be included in CGPA)	2-4
	Mir	nimum Credits to be earned for the award of the Degree	164
			From A to D
			and 2 from E

THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015 B.E. / B.Tech. Degree Programmes

COURSES OF STUDY

(For the candidates admitted from 2015-16 onwards)

FIRST SEMESTER

Course	Name of the Course	Category	No. of Hours		lours	credits
Code			/ Week		/ Week	
			L	Т	Р	
THEORY						
14MA110	Engineering Mathematics I	BS	2	2	-	3
14PH120	Physics	BS	3	-	-	3
14CH130	Chemistry	BS	3	-	-	3
14EG141	English	HSS	3	-	-	3
14ES150	Basics of Civil and Mechanical	ES	2	-	-	2
	Engineering					
14ES160	Basics of Electrical and Electronics	ES	2	-	-	2
	Engineering					
THEORY	CUM PRACTICAL					
14ME170	Engineering Graphics	ES	2	-	2	3
PRACTIC	AL .					
14PH180	Physics Laboratory	BS	-	-	2	1
14CH190	Chemistry Laboratory	BS	-	-	2	1
	Total		17	2	6	21

BS : Basic Science

HSS : Humanities and Social Science

ES : Engineering Science

- L : Lecture
- T : Tutorial
- P : Practical

Note:

- 1 Hour Lecture is equivalent to 1 credit
- 2 Hours Tutorial is equivalent to 1 credit
- 2 Hours Practical is equivalent to 1 credit

THIAGARAJAR COLLEGE OF ENGINEERING: MADURAI – 625 015 B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2015-16 onwards)

FIRST SEMESTER

S.No.	Course Code	Name of the Course	Duration of	Marks			Minimum Marks for Pass		
			Terminal	Contin	Termin	Max.	Terminal	Total	
			Exam. in	uous	al	Mark	Exam		
			Hrs.	Asses	Exam	S			
				sment *	**				
THEOR	Y	I							
1	14MA110	Engineering Mathematics I	3	50	50	100	25	50	
2	14PH120	Physics	3	50	50	100	25	50	
3	14CH130	Chemistry	3	50	50	100	25	50	
4	14EG141	English	3	50	50	100	25	50	
5	14ES150	Basics of Civil and Mechanical Engineering	3	50	50	100	25	50	
6	14ES160	Basics of Electrical and Electronics Engineering	3	50	50	100	25	50	
THEOR	Y CUM PRAC	TICAL							
7	14ME170	Engineering Graphics	3	50	50	100	25	50	
PRACT	ICAL								
8	14PH180	Physics Laboratory	3	50	50	100	25	50	
9	14CH190	Chemistry Laboratory	3	50	50	100	25	50	

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 50 marks for the award of terminal examination marks

14MA110 ENGINEERING MATHEMATICS - I

Category L T P Credit BS 2 2 0 3

Preamble

The driving force in engineering mathematics is the rapid growth of technology and the sciences. Matrices have been found to be of great utility in many branches of engineering applications such as theory of electric circuits, aerodynamics, mechanics and so on. Many physical laws and relations can be expressed mathematically in the form of differential equations. Based on this we provide a course in matrices, calculus and differential equations.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to CO1:Find the inverse and the positive powers of a square matrix CO2:Apply the concept of orthogonal reduction to diagonalise the given	Understand Apply
matrix	
CO3:Find the radius of curvature, circle of curvature and centre of	Understand
curvature for a given curve.	
CO4:Determine the evolute and envelope for a given family of curves	Apply
CO5:Classify the maxima and minima for a given function with several variables, through by finding stationary points	Analyse
CO6:Apply Lagrangian multiplier method for finding maxima and minima	Apply
of an unconstrained problem	
CO7:Predict the suitable method to solve second and higher order	Apply
differential equations	

Assessment Pattern

Bloom's	Co Asses	ontinuo ssment	us Tests	Terminal Examination
Category	1	2	3	Examination
Remember	10	10	10	20
Understand	30	30	30	20
Apply	40	40	40	50
Analyse	20	20	20	10
Evaluate	0	0	0	0
Create	0	0	0	0

Course Level Assessment Questions

Course Outcome 1 (CO1):

1. Suppose an nxn matrices A and B have the same eigen values $\lambda_1, \lambda_2, ..., \lambda_n$ with the same

Independent eigen vectors $X_1, X_2, ..., X_n$. Show that A = B.

2. Find the 2x2 matrix having eigen values $\lambda_1 = 2$ and $\lambda_2 = 5$ with corresponding eigen vectors $X_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$, $X_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$.

3. Find A⁻¹ and A⁴ for a given square matrix A = $\begin{pmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{pmatrix}$, using Cayley

Hamilton theorem.

4. Compute the eigenvalues and eigenvectors of A = $\begin{pmatrix} 7 & 2 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{pmatrix}$

Course Outcome 2 (CO2):

- 1. Transfer the given quadratic form $6x_1^2 + 3x_2^2 + 14x_3^2 + 4x_1x_2 + 4x_2x_3 + 18x_3x_1$ to canonical by an orthogonal transformation.
- 2. Diagonalise the matrix A = $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$
- 3. Discuss when a quadratic form is singular. What is the rank then?

Course Outcome 3 (CO3)

- 1. Predict the radius of curvature of the curve $x^3 + xy^2 6y^2 = 0$ at (3,3).
- 2. Identify the centre of curvature of the curve $y = x^3 6x^2 + 3x + 1$ at (1,-1).
- 3. Find the equation of the circle of curvature of the curve $y^3 + x^3 = 3axy$ at the point $\left(\frac{3a}{2}, \frac{3a}{2}\right)$.

Course Outcome 4 (CO4)

- 1. Predict the evolute of the parabola $x^2 = 4ay$.
- 2. Predict the envelope of the straight line $\frac{x}{a} + \frac{y}{b} = 1$, where a and b are parameters that are connected by the relation a+b=c.
- 3. Is it possible to find the curvature of a straight line? Justify your answer.

Course Outcome 5 (CO5)

- 1. Examine the extrema of $f(x, y) = x^2 + xy + y^2 + \frac{1}{x} + \frac{1}{y}$.
- 2. Identify the saddle point and the extremum points of $f(x, y) = x^4 y^4 2x^2 + 2y^2$.
- 3. Analyse the extrema of the function $f(x, y) = x^2 2xy + y^2 + x^3 y^3 + x^4$ at the origin **Course Outcome 6 (CO6)**
 - 1. Apply Lagrangian multiplier method to find the shortest and the longest distances from the point (1,2,-1) to the sphere $x^2 + y^2 + z^2 = 24$.
 - 2. Exhibit the point on the curve of intersection of the surfaces z=xy+5 and x+y+z=1 which is nearest to the origin.
 - 3. The temperature at any point (x,y, z) in a space is given by $T = kxyz^2$, where k is a constant. Find the highest temperature on the surface of the sphere $x^2 + y^2 + z^2 = a^2$.

Course Outcome 7 (CO7)

- 1. Solve the equation $y'' + a^2 y = \tan ax$ by the method of variation of parameters.
- 2. Compute the solution of the given equation $(x^2D^2 2xD 4)y = 32(\log x)^2$.
- 3. Predict the solution of $((2x+3)^2D^2 2(2x+3)D 12)y = 6$.
- 4. Solve the simultaneous equations x'+2x-3y = 5t, $y'-3x+2y = 2e^{2t}$.

Concept Map



Syllabus

MATRICES: Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values –Cayley Hamilton theorem- Orthogonal reduction of a symmetric matrix to diagonal form –Orthogonal matrices –Reduction of quadratic form by orthogonal transformation, Applications.

GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS: Curvature – Cartesian and Polar coordinates – Centre of curvature, Circle of curvature – Evolutes and Envelopes, **Applications.**

FUNCTIONS OF SEVERAL VARIABLES: Function of two variables – Partial derivatives – Total derivative – Change of Variables - Jacobians - Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangian Multiplier method, Applications.

ORDINARY DIFFERENTIAL EQUATIONS: Linear differential equations of second and higher order with constant coefficients - Method of variation of parameters – Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation and Legendre's linear equation - Simultaneous linear equations with constant coefficients. Applications.

Text Books

- 1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley & Sons. Singapore, 10thedition, 2012.
- 2. Grewal.B.S, Higher Engineering Mathematics, Khanna Publications, 42nd Edition, 2012.

Reference Books

- 1. Veerarajan.T, "Engineering Mathematics I", Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.
- 2. Kandasamy .P et.al. "Engineering Mathematics", Vol.I (4th revised edition), S.Chand &Co, New Delhi, 2000.

Module		No.of
No.		Lectures
1	MATRICES	
1.1	Characteristic equation – Eigen values and Eigen vectors of a real	2
	matrix	
1.2	Properties of Eigen values	1
	Cayley Hamilton theorem	2
	Tutorial	1
1.3	Orthogonal reduction of a symmetric matrix to diagonal form	2
1.4	Orthogonal matrices –Reduction of quadratic form by orthogonal	1
	transformation.	
1.5	Applications	1
	Tutorial	1
2	GEOMETRICALAPPLICATIONSOFDIFFERENTIALCALCULUS	
2.1	Curvature – Cartesian and Polar co-ordinates	2
2.2	Centre of curvature, Circleofcurvature	2
	Tutorial	1
2.3	Evolutes	2
2.4	Envelopes.	2
2.5	Applications	1
	Tutorial	1
3	FUNCTIONS OF SEVERAL VARIABLES	
3.1	Function of two variables – Partial derivatives	1
3.2	Total derivative	1
	Tutorial	1
3.3	Change of Variables ,Jacobians	2
3.4	Taylor's expansion	1
3.5	Maxima and Minima	2
3.6	Constrained Maxima and Minima by Lagrangian Multiplier method	2
3.7	Applications	1
	Tutorial	1
4	ORDINARY DIFFERENTIAL EQUATIONS	
4.1	Linear differential equations of second and higher order with constant	2
	coefficients.	
	Tutorial	1
4.2	Cauchy's homogeneous linear equation	1
4.3	Legendre's linear equation	1
4.4	Method of variation of parameters	1
4.5	Simultaneous linear equations with constant coefficients.	2
4.6	Applications	1
	Tutorial	1
	Total	44
Course De	esigners:	

Course Contents and Lecture Schedule

UISE L	colylicio.	
1.	Mr. P. Subramanian	psmat@tce.edu
2.	Dr. V. Gnanraj	vgmat@tce.edu
3.	Dr. S. Jeya Bharathi	sjbmat@tce.edu
4.	Dr. G Jothilakshmi	gjlmat@tce.edu
5.	Dr. A.P.Pushpalatha	appmat@tce.edu
6.	Dr .M.Sivanandha Saraswathy	sivanandha@tce.edu

		Category	L	Т	Ρ	Credit
14PH120	PHYSICS	BS	3	0	0	3

Preamble

The course work aims in imparting fundamental knowledge of thermodynamics, quantum physics and optics which are essential in understanding and explaining engineering devices and measuring instruments. The objective of the course is to help students acquire a basic knowledge for thermal applications, electron microscopy techniques and fibre optic communication systems.

Prerequisite

NIL

Course Outcomes

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

Assessment Pattern

CO1:	Compute the theoretical efficiency of a Carnot's engine	Apply
CO2:	Calculate the change in entropy in a thermal cycle	Apply
CO3:	Explain the basic concept of quantum theory	Understand
CO4:	Describe the working principle of SEM and TEM	Understand
CO5:	Compare and contrast the properties and applications of laser and ordinary incandescent light	Analyse
CO6:	Illustrate the principle of light transmission in a fibre and compare its advantages as a wave guide over the conventional co-axial cable	Analyse
CO7	Explain the basic principle, construction and working of optical	Inderstand

CO7: Explain the basic principle, construction and working of optical Understand fibre sensor

Bloom's	Continuous Assessment Tests			Terminal
Category	1	2	3	Examination
Remember	10	10	10	10
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	20	20	20	20
Evaluate	0	0	0	0
Create	0	0	0	0

Course Level Assessment Questions

Course Outcome 1 (CO1):

- 1. Show that the efficiency of an ideal heat engine depends only on the temperature of the source and sink.
- 2. Compute the efficiency of a Carnot's engine working between the steam point and the ice point.
- 3. A Carnot's engine is operated between two reservoirs at temperature of 450K and 350K.If the engine receives 1000 calories of heat from the source in each cycle. Calculate the amount of heat rejected to the sink and work done by the engine in each cycle.

Course Outcome 2 (CO2):

- 1. Compute the change in entropy when 5 kg of water at 100°C is converted into steam at the same temperature. (Latent heat of vaporisation=540cal/g)
- 2. Show that the area of the temperature-entropy diagram of a Carnot's cycle is the useful work done per cycle.
- 3. One mole of a gas expands isothermally to four times its volume. Calculate the change in entropy in terms of gas constant.

Course Outcome 3 (CO3):

- 1. Describe Planck's law of black body radiation.
- 2. Summarize the physical significance of wave function.
- 3. Explain Compton Effect and derive an expression for the wavelength of the scattered photon.

Course Outcome 4 (CO4):

- 1. Explain the construction and working of TEM.
- 2. Explain the wave-particle duality of matter and obtain an expression for de Broglie wavelength.
- 3. Describe the construction and working of SEM.

Course Outcome 5 (CO5):

- 1. Find the ratio of population of two energy states in a Laser, the transition between which is responsible for the emission of photons of wavelength 6893A at a temperature of 300K.Comment on the type of emission based on the ratio of population.
- 2. Analyse the role of mixture of gases for a CO2 laser and predict the working of the laser without Helium gas in the mixture.
- 3. Differentiate between CO₂ laser and NdYAG Laser with respect to their construction and energy level diagram.

Course Outcome 6 (CO6):

- 1. Compare and contrast the material properties of core and cladding
- 2. Identify the major advantages of optical fibre communication system over conventional communication systems
- 3. Draw the refractive index profile of step index and graded index fibres and comment on the advantages of graded index fibre based on refractive index profile.

Course Outcome 7 (CO7)

- 1. Define a sensor with an example.
- 2. Explain the classification of fibre optic sensors based on their working principle.
- 3. Explain the principle and working of temperature sensor

Concept Map



Syllabus

Thermodynamics

Introduction to thermodynamics-Thermodynamic process-Work done in isothermal and adiabatic process- First and second law of thermodynamics- Carnot's engine-Refrigerator, Temperature-Entropy diagram-Change in entropy in reversible and irreversible process-Entropy of a perfect gas. Application: Otto cycle- Internal Combustion engine.

Quantum Physics

Planck's quantum theory of blackbody radiation-Compton effect-De-Broglie Hypothesis-Davisson & Germer experiment-wave function and its properties-Uncertainty principle-Schrodinger wave equation-Time dependent and time independent equations-particle in a box.

Application: Scanning Electron Microscope-Transmission Electron Microscope

Laser and Fibre Optics

Fundamentals of laser-Spontaneous and Stimulated emission-Laser action-characteristics of laser beam-Einstein coefficients-Nd-YAG laser, CO₂ laser-applications of laser- Holography

Fibre Optics-Principle and propagation of light in Optical fibre-Numerical aperture-Acceptance angle-Classification of Optical fibre based on material, refractive index and mode-Fibre Optic communication system.

Application: Fibre Optic sensors- temperature, and displacementsensors.

Text Books

- 1. Paul G Hewitt, "Conceptual Physics", 12th Edition Pearson Higher Education Pvt. Ltd., 2014.
- 2. Gour R.K. and Gupta S.L., "Engineering Physics", 8thEdition Dhanpat Rai Publications, 2006

Reference Books

- 1. Arthur Beiser," Concepts of Modern Physics",McGraw Hill Education(India)Pvt Limited,6thEdition, 2003
- 2. Stephen Blundell, "Concepts in Thermal Physics", Oxford University Press,2nd Edition 2010.
- 3. Gerd keiser," Optical fiber communications", Tata Mc Graw Hill Pvt Ltd,4thEdition 2008.

Modulo		
No	Торіс	No. of Lectures
1.	Thermodynamics	
1.1	Introduction to thermodynamics-Thermodynamic processes	2
1.2	Work done in isothermal and adiabatic process	2
1.3	First and second law of thermodynamics	2
1.4	Carnot's engine- theoretical efficiency expression-Refrigerator	2
1.5	Temperature-Entropy diagram	1
1.6	Change in entropy in reversible and irreversible process	2
1.7	Entropy of a perfect gas	2
1.8	Application: Otto cycle- Internal Combustion engine.	2
2.	Quantum Physics	
2.1	Planck's quantum theory of blackbody radiation	2
2.2	Compton effect- derivation	3
2.3	Davisson & Germer experiment	2
2.4	Wave function and its properties-Uncertainty principle	2
2.5	Schrodinger wave equation-Time dependent and time	2
	independent equations	
2.6	Particle in a box - Problems	2
2.7	Application: Scanning Electron Microscope-Transmission	2
	Electron Microscope	
3.	Laser and Fibre Optics	
3.1	Fundamentals of laser, Spontaneous and Stimulated emission	1
3.2	Laser action-characteristics of laser beam	2
3.3	Einstein coefficients	1
3.4	Nd-YAG laser	1
3.5	CO ₂ laser	1
3.6	Applications of laser- Holography	1
3.7	Principle and propagation of light in Optical fibre	1
3.8	Numerical aperture-Acceptance angle	2
3.9	Classification of Optical fibre based on material, refractive	2
	index and mode	
3.10	Fibre Optic communication system	1
3.11	Application: Fibre Optic sensors- temperature, and	2
	displacementsensor	
	Total	42

Course Contents and Lecture Schedule

Course Designers:

1. Dr.R.Vasuki

2. Mr. A.L.Subramaniyan

3. Mr. D.Ravindran

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14CH130	CHEMISTRY	Category	L	Т	Ρ	Credit
		BS	3	0	0	3

Preamble

The objective of this course is to bestow better understanding of basic concepts of chemistry and its applications on diverse engineering domains. It also imparts knowledge on properties of water and its treatment methods, Engineering materials and its protection from corrosion, Energy storage technologies, properties of fuels and combustion. This course also highlights criteria behind selecting materials for various engineering applications and their characterization.

Prerequisite

NIL

Course Outcomes

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

- CO 1. Estimate the hardness of water
- CO 2. Identify suitable water treatment methods
- CO 3. Describe the components and working of energy storage devices
- CO 4. Illustrate control methods for various forms of corrosion
- CO 5. Enumerate the quality of fuels from its properties
- CO 6. Outline the important features of fuels
- CO 7. Select appropriate materials for specific applications

Assessment Pattern

Bloom's	Continuous Assessment Tests			Terminal	
Calegory	1	2	3	Examination	
Remember	20	20	20	20	
Understand	40	30	30	30	
Apply	40	40	40	40	
Analyze	0	10	10	10	
Evaluate	0	0	0	0	
Create	0	0	0	0	

Course Level Assessment Questions

Course Outcome 1 (CO1):

- 1. Differentiate temporary and permanent hard water.
- 50 ml of given water sample consumed 18 ml of EDTA during titration using EBT indicator. 25 ml of same EDTA consumed by 50 ml of standard hard water containing 1 mg of pure CaCO₃ per ml. Calculate the hardness of given water samples in ppm.
- 3. Describe the essential characteristics of drinking water.

Course Outcome 2 (CO2):

- 1. Compare the mechanisms involved in ion exchange and zeolite methods of water treatment.
- 2. Appraise the treatment steps followed in municipal water supply.
- 3. Criticize the internal treatment methods of water.

Analyze Understand Apply Remember Analyze Apply

Apply

Course Outcome 3 (CO3):

- 1. Describe the working of lithium ion battery with the help of electrode reactions.
- 2. Demonstrate the advantages of fuel cell over conventional batteries.
- 3. Explain the types of battery.

Course Outcome 4 (CO4)

- 1. Illustrate the different forms of corrosion
- 2. Collect and explain the factors which influence the corrosion.
- 3. Exhibit the various forms of corrosion control methods

Course Outcome 5 (CO5)

- 1. Define the calorific value of the fuel
- 2. Describe the cetane and octane numbers of the fuel.
- 3. List the characteristics of good fuel

Course Outcome 6 (CO6)

- 1. Assess the quality of coal by performing proximate and ultimate analysis
- Calculate the minimum volume of air required for the complete combustion of 1 m³ of gaseous fuel containing the following composition by volume. CO: 23%; H₂:12%; CH₄: 3%; CO₂: 5%; N₂: 55%; and O₂: 2%.
- 3. Compare: Liquefied petroleum gas and bio gas.

Course Outcome 7 (CO7)

- 1. Explicate the characteristics of good refractory material.
- 2. Demonstrate the preparation of nano materials by sol-gel method.
- 3. Exhibit the applications of polymer composites.

Concept Map



Syllabus

WATER: Standards for drinking water, Hardness. Softening of water: External and Internal treatments of water, Boiler troubles, Methods of treatment of municipal water .

ELECTROCHEMICAL PROCESSES AND ENERGY SOURCES:Introduction -Electroplating – Principle- Significant parameters and applications-PCB manufacturing- Electroless plating.**Batteries** –Primary and secondary batteries – Characteristics- Examples. Fuel cells - Classification and working principles. **Corrosion**: Principle-types- forms and control methods.

FUELS AND COMBUSTION: Fuels-Introduction- classification of fuels- calorific values - analysis of coal. **Combustion** –principle- calculation of fuel and air ratio- knocking characteristics - flue gas analysis –gaseous fuels - alternate fuels.

ENGINEERING MATERIALS: Refractories: Definition, characteristics, classification, properties-requisites of good refractory and their uses –**Polymers**: classification-Industrially important polymers – PE, PET, PVC – PU – nylon – epoxy resins – Bakelite-preparation properties and uses-conducting polymer-bio-polymer-polymer composites-**Nanomaterials**: Size-dependent properties – synthesis by physical and chemical methods –applications-future perspectives.

Text Book

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai publishing Company (P) Ltd, NewDelhi,15th Edition, 2008.

Reference Books

- 1. S.S. Dara and S.S.Umare, "A Textbook of Engineering Chemistry", S.Chand & Company, 12th Edition, Reprint, 2013.
- 2. V R Gowariker, N V Viswanathan and Jayadev Sreedhar, "Polymer Science" New age International Publisher, 2012.
- 3. Charles P.Poolejr and Frank J.Owens, "Introduction to Nanotechnology", Wieli-India, 2008.

Module No.	Торіс	No. of Lectures
1.0	Water	
1.1	Introduction: importance of water, standards for drinking water, physical, chemical & biological parameters. (WHO, BIS & ICMR standards)	1
1.2	Alkalinity (principle only), Hardness of water – types, units,	1
1.3	Determination of hardness by EDTA method and problems	2
1.4	Softening of water: External treatment methods: Lime-soda process (concept only), zeolite process,	1
1.5	ion exchange process, reverse osmosis, electro dialysis	2
1.6	Solar and multistage flash distillation, nanofiltration	1
1.7	Boiler trouble: scale and sludge formation, boiler corrosion, priming and foaming, caustic embrittlement,	2
1.8	Internal treatment methods: Carbonate, Phosphate, Colloidal, Calgon conditioning,	1
1.9	municipal water treatment	1
2.0	Electrochemical process and Energy sources	
2.1	Electrochemistry- introduction-Electroplating- Definition, Principles- Significant parameters	2
2.2	Nickel and Chromium electroplating	1
2.3	Electroless plating – PCB manufacturing	1
2.4	Corrosion- definition, mechanism, forms of corrosion	2

Course Contents and Lecture Schedule

Module No.	Торіс	No. of Lectures
2.5	Factors influencing corrosion and corrosion control methods	2
2.6	Batteries- Definition, types-dry cell, lead acid and lithium batteries	2
2.7	Fuel cells- principle, types and applications. (H_2O_2 fuel cell)	1
3.0	Fuels and combustion	
3.1	Introduction- Classification of fuels	1
3.2	Calorific Values- Theoretical calculation using Dulong's formula	1
3.3	Coal – classification- Analysis of coal- Proximate and Ultimate analysis	2
3.4	Refining of petroleum- Knocking characteristics-Octane and Cetane numbers	1
3.5	Natural gas- Liquefied petroleum gas- producer gas-bio gas- alternate fuels- power alcohol- bio diesel	2
3.6	Combustion- calorific intensity- SIT- Calculation of minimum quantity of air required for combustion	2
3.7	Flue gas analysis	1
3.8	Gaseous fuels	1
3.9	Alternate fuels	1
4.0	Engineering materials	
4.1	Refractories: Definition-physical and chemical characteristics- classification, properties-requisites of good refractory and their uses	2
4.2	Polymers: classification-Industrial important polymers – PE, PET, PVC – PU– nylon – epoxy resins- Bakelite- preparation properties and uses	2
4.3	conducting polymer mechanism -bio-polymer-polymer composites	1
4.4	Nanomaterials: Size-dependent properties – synthesis by physical (laser ablation, PVD) and	2
4.5	chemical methods (solgel, hydro thermal) - applications-future perspectives	2
	Total number of Lectures	44

Course Designers:

- 1. Dr.K.Radha
- 2. Dr. M.Kottaisamy

3. Mrs.J.Shanmugapriya

4. Mr.S.Rajkumar

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14EG141 ENGLISH		Category	L	Т	Ρ	Credit
		HSS	2	1	0	3

Preamble

This is a life skill course necessary for all students of Engineering and Technology. The course work aims at developing communication skills in English essential for understanding and expressing the ideas in different social, academic and professional contexts. The outcome of the course is to help the students acquire the language skills of listening, speaking, reading and writing competency in English language thereby making them competent and employable in the globalised scenario.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to	
CO1. listen, understand and respond to others in different situations	Understand
CO2.speak correctly and fluently in different situations using	Apply
appropriate communication strategies.	
CO3. read and comprehend a variety of texts adopting different	Understand
reading skills	
CO4. write with clarity in simple, apt and flawless language with	Apply
coherence and cohesion	
CO5. use their communicative competency with precision and clarity	Understand
in the context of science and technology	
CO6.be interpersonal and proactive in using language confidently	Create
and effectively for personal and profession growth	

Sessment rattern				
Bloom's Catogory	Continuous Assessment Tests			Terminal Examination
BIOOIII'S Calegory	1	2	3	
Remember	20	20	20	20
Understand	40	40	40	40
Apply	20	20	20	20
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	20	20	20	20
Create	20	20	20	20

Assessment Pattern

Course Level Assessment Questions

Course Outcome 1 (CO1):

- 1. Tested by way of assignments like listening to short speeches of contexts general and technical
- 2. Answering questions objective and descriptive
- 3. Note taking

Course Outcome 2 (CO2):

- 1. Tested by way of assignments like role play, mini presentation, self-introduction, situational conversation and one-to-one debate
- 2. Write down an imaginary dialogue between a father and a son about his/her fresh college experience. (in five exchanges, not more than 150 words)

- 3. Choose the right option that at best fits in the blanks (Mention A or B or C or D only) They are to _____ a question paper to identify the moral _____ of the young candidates.
- A. /privent/-/kæriktə^r/ B. /sət/-/k<u>a</u>ndʌ kt/ C. /pripeə^r/-/k<u>b</u>ndʌ kt/ D. /prezəns/-/kəud/ 4. Read the following phonemic sentence and answer the question below:
 - /ðeə^r iz nəu klp k in ðə kla:sru:m/
 - What is unavailable in the learning place?

Course Outcome 3 (CO3):

1. Read the following passage and answer the following questions.

- A passage from the context of science and technology/current issues will be given followed by different types of questions/exercises like:
- Descriptive questions for eliciting short answers
- True or False
- Sentence Completion
- Objective type
- Synonyms /meaning of the words in the text
- 2. Read the passage given under Q.No. 1a and 'make notes' (Not exceeding 100 words).

3. Read the passage given under Q.No.1a and write a summary (Not exceeding 100 words).

Course Outcome 4 (CO4):

- 1. Rewrite the following sentence using the appropriate modal auxiliary
- The variation in reading is to be noted down every minute compulsorily for the first five minutes.
- 2. Expand the nominal compounds: 1. Credit Card 2. Newspaper Glasses
- 3. Complete the following: The function of a mini drafter ------
- 4. What is meant by a topic sentence?
- 5. Write a set of recommendations to save electric power.

Course Outcome 5 (CO5):

1. Analyse and interpret the following graphic data in about 100 words:



- 2. Write a basic definition of an MP3 player.
- 3. Establish cause and effect relationship for the following:

The trade imbalance is likely to rise again in 2015. A new set of policy actions will be required soon. **Course Outcome 6 (CO6):**

- 1. Write a letter to the HR Manager, TCS, Chennai, requesting him to grant permission for your In-plant Training during your summer vacation.
- 2. Write a paragraph in about 100 words on "The Impact of Technology on Nature"
- 3. Prepare a set of 10 instructions on how to draw money from an ATM.



Listening

Listening to news bulletins, lectures and conversations; answering comprehension questions; active listening; note-taking

Speaking

Pronunciation, Syllable and Stress; Contracted forms, Courtesy words; Situational conversation, One-to one debate and Mini presentation on extensive reading and Dailies.

Reading

Skipping, Scanning and Skimming; Reading for information and pleasure; Study skills – Comprehension, Note-making and Summarizing

Writing

Vocabulary : Word analysis, Parts of Speech (Nouns, Verbs, Adjectives, Adverbs Articles, Prepositions, Conjunctions); Sentences Types (Affirmative, Negative, Interrogative, Imperative, Exclamatory) ; Sentence Structure (Subject Verb Agreement, Tenses, Voices, Modals, Conditionals, Relative clauses, Reported Speech); Dialogue Writing, Notions (Nominal Compounds, Definition, Classification, Cause and Effect, Purpose and Function) Paragraph Writing: Compare and Contrast, Descriptive; Formal Letters; Interpretation of Graphics; Instructions and Recommendations.

Text Book

Study Material prepared by the Department of English

Reference Books

- 1. Department of English, Anna University, Mindscapes: English for Technologists and Engineers, Orient Blackswan, Chennai, 2012
- 2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering, Orient Blackswan, Chennai, 2011
- 3. Murphy, Raymond English Grammar in Use with Answers: Reference and Practice for Intermediate Students, Cambridge : CUP, 2004
- 4. Jones, Daniel. An English Pronouncing Dictionary, Cambridge: CUP, 2006
- 5. Prasad, Hari Mohan , Sinha, Uma Rani , Objective English for Competitive Examinations, Tata McGraw-Hill: Noida, 2010
- 6. Thomson, A.J. and Martinet, A.V. A Practical English Grammar, OUP, New Delhi:1986
- 7. Lewis, Norman, Word Power Made Easy, Goyal Publishers, New Delhi: 2004

Course C		
Module No.	Торіс	No. of Lectures
1.	Introduction	1
2.	Listening to News, Lectures, Conversations - Practice	1
3.	Comprehension Exercises	1
4.	Active Listening and Note-taking	1
5.	Introduction to Phonemes	1
6.	Syllables and Stress	1
7.	Contracted Forms, Courtesy Words	1
8.	Situational Conversation, Telephonic Conversation	1
9.	Reading - Skimming, Skipping and Scanning	1
10.	Note Making and Summarizing	1
11.	Dialogue Writing	1
12.	Vocabulary - Word Analysis, Parts of Speech	1
13.	Types of Sentences	1
14.	Tutorial	1
15.	Presentation Skills (Activity)	2
16.	Reading Comprehension	2
17.	Subject Verb Agreement	1
18.	Tenses	2
19.	Voices	1
20.	Modals	1
21.	Conditions	1
22.	Relative Clause	1
23.	Reported Speech	1
24.	Formal Letter Writing	1
25.	Instruction Writing	1
26.	Tutorial	1
27.	Nominal Compounds	1
28.	Definition and Classification	1
29.	Cause and Effect	1
30.	Purpose and Function	1
31.	Paragraph Writing	2
32.	Recommendation Writing	1
33.	Interpretation of Graphics	2
34.	Spoken Assignment	3
35.	Tutorial	1
36.	Revision	2
37.	Feedback	1
	Total	45

Course Contents and Lecture Schedule

Course Designers:

- Dr.T.Sadasivan 1
- 2 Dr.S.Rajaram
- 3 4 Dr.A.Tamilselvi
- Mr.Vinoth.R
- 5 Ms.R.K.Jai Shree Karthiga

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14ES150 BASICS OF CIVIL AND MECHANICAL ENGINEERING

Category L T P Credit ES 2 0 0 2

A. BASICS OF CIVIL ENGINEERING

Preamble

This course will create awareness on fundamental knowledge on various domains of Civil Engineering

Prerequisite

• NIL

Course Outcomes

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

- CO1: Identify the branches of Civil Engineering and roles of a Understand Civil Engineer
 CO2: Explain the properties and uses of building materials, Understand Concept of green building
 CO2: Identify the functions of various components of Understand
- CO3: Identify and explain the functions of various components of Understand a residential building and building safety devices
- CO4: Explain the properties and classifications of soils and Understand appropriate foundation for different soil conditions
- CO5: Identify the various sources of water and need for rain water Understand harvesting
- CO6: Explain the various stages of works involved in water supply Understand and sewerage projects.
- CO7: Classify roads and explain the importance of signalling Understand

Assessment Pattern

Bloom's	Continuous Assessment Tests			Terminal	
Calegory	1	2	3		
Remember	20	20		20	
Understand	30	30		30	
Apply					
Analyse					
Evaluate					
Create					

CAT 3 – ASSIGNMENT (GROUP PRESENTATION) Course Level Assessment Questions Course Outcome 1 (CO1):

- 1. List the various branches of Civil Engineering
- 2. Compare the roles of Structural and Environmental Engineers
- 3. Discuss the various functions of a Civil Engineer

Course Outcome 2 (CO2):

- 1. Discuss the properties of a building stone
- 2. Mention the types of cement
- 3. Compare PCC and RCC and mention the applicability of each

Course Outcome 3 (CO3)

- 1. Draw the cross section through a wall and explain the functions of various components
- 2. Compare arches and lintels
- Write the purpose of DPC in buildings

Course Outcome 4 (CO4)

- 1. Define foundation and mention its various types
- 2. Enumerate the various engineering properties of soil
- 3. Explain the situations requiring deep foundations.

Course Outcome 5 (CO5)

- 1. Explain the various sources of water
- 2. Draw and explain the hydrological cycle
- 3. Write the need for preserving water, mentioning its methods

Course Outcome 6 (CO6)

- 1. Define per capita demand
- 2. Explain the necessity for treatment of water
- 3. Explain the need for sewerage

Course Outcome 7 (CO7)

- 1. Discuss the classification of roads
- 2. List the various modes of transportation
- Write the need and importance for signalling in roads.

Concept Map



Syllabus

General: Introduction – Functions and role of Civil Engineer- Branches of Civil Engineering. Materials and Components: Materials - Properties, classification and characteristics of building stones, bricks, timber, cement and cement concrete, reinforcing steel- Components of residential building. Green building concepts and building safety devices. Soil Mechanics and Foundation: Geological cycle – Soil classification – Engineering properties. Foundation - Types and necessity. Water Resources: Sources of water - Hydrologic cycle - Rain water harvesting - importance - methods of rain water harvesting. Environmental Engineering- Water demand estimation – Sources of water – Quality of water – Treatment of water- Water distribution. Sewerage - need and importance - collection, treatment and disposal of sewage – Septic tanks. **Transportation:** Modes of transport – types. Roads – Classification of rural and urban roads. Traffic signs and road marking – Traffic signals.

Text Book:

1. Lecture Notes prepared by TCE Civil Engineering Faculty

Reference Books

- 1. G.Shanmugam and M.S.Palanichamy, "Basics of Civil and Mechanical Engineering", Tata McGraw Hill Publishers, New Delhi, 2014
- 2. T. Jha and S.K. Sinha, "Construction and Foundation Engineering", Khanna publishers, Delhi, 2003
- 3. Ahuja and Birdi, , "Fundamentals of Building Construction" Dhanpat Rai and sons Delhi, 2000
- 4. Rangwala and S.B.Patel, "Engineering materials", Charotar publishing house, Anand, 2002
- 5. S.K. Garg, "Water Supply Engineering", Khanna publishers, Delhi, 2005
- 6. S.K. Garg, "Sewage Disposal and Air Pollution Engineering", Khanna publishers, Delhi, 2005
- 7. Khanna and Justo, "Highway Engineering", New Chand and Bros, Roorkee, 2000

Course	Course Contents and Lecture Schedule					
Module No.	Торіс	No. of Lectures				
1.0	General					
1.1	Roles of Civil Engineer	1				
1.2	Branches of Civil Engineering					
2.0	Materials and Components					
2.1	Building stone – properties, types, characteristics and uses	1				
2.2	Bricks and timber - properties, types, characteristics and uses	1				
2.3	Cement- properties, types, characteristics and uses					
2.4	Cement concrete and reinforcing steel - properties and uses	1				
2.5	Components of residential buildings – purpose	2				
3.0	Soil Mechanics and Foundation					
3.1	Geological Cycle- Soil classification, engineering properties	1				
3.2	Types and necessities of foundation	1				
4.0	Water Resources					
4.1	Sources of water and hydrologic cycle	1				
4.2	Rain water harvesting- importance and methods	1				
5.0	Environmental Engineering					
5.1	Water demand estimation, quality and treatment of water	1				
5.2	Methods of water distribution	1				
5.3	Sewerage- need and importance, collection, treatment and disposal-Septic tank	1				
6.0	Transportation					
6.1	Modes of transport	1				
6.2	Road classification					
6.3	Traffic signs and road marking	2				
	Total periods	16				

Course Designers:

- 1. Dr. T. Vel Rajan
- 2. Dr. S. Nagan
- 3. Dr. R. Velkennedy
- 4. Dr. G. Chitra
- 5. Dr. T. Baskaran
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B. BASICS OF MECHANICAL ENGINEERING

Preamble

Basic Mechanical Engineering gives the fundamental ideas in the areas of engineering design, manufacturing and thermal engineering. An engineer needs to understand the design procedures, manufacturing techniques and working principle of an engineering component.

Prerequisite

NIL

Course Outcomes	
On successful completion of the course, students will be able to CO1:Describe the steps involved in component design and transmission systems	Understand
CO2:Explain the manufacturing processes such as casting, forming, joining, and machining	Understand
CO3:Describe the Functions of Prime movers, working of IC engines and refrigerator	Understand
CO4:Explain the various safety practices in industries and personal protective elements	Understand

Assessment Pattern

Abbobbinont i attorn				
Bloom's Catogony	Cont	tinuous Ass	Terminal	
Bloom S Category	1	2	3	Examination
Remember	40	40	Assignment	40
Understand	60	60	evaluation	60
Apply				
Analyse				
Evaluate				
Create				

Course Level Assessment Questions

Course Outcome 1 (CO 1):

- 1. Describe the evolution of mechanical engineering
- 2. State the need for design
- 3. Define stress

Course Outcome 2 (CO 2):

- 1. What is rolling?
- 2. What is the need of metal joining
- 3. State the applications of casting.

Course Outcome 3 (CO 3):

- 1. State the function of prime mover.
- 2. Explain the vapour compression refrigeration system
- 3. Compare the two stroke and four stroke engine

Course Outcome 4 (CO 4):

- 1. State the various precautions are to taken by the welder
- 2. Explain the various personal safety practices in industries with reference to OSHA



History and evolution of Mechanical Engineering

Steps of design procedure –Materials for engineering components, stress, strain, Factor of safety. Transmission systems- Belt and gear drives

Manufacturing processes – Types of manufacturing industries and manufacturing systems, foundry - green sand mould casting. Metal forming - forging, rolling, extrusion, drawing, Metal joining – Resistance Arc welding and Gas welding. Metal machining (construction and operation only) - lathe, metal finishing- Surface grinding

Energy resources - Renewable, Non renewable energy. Prime movers- Types and applications. Internal Combustion Engine- working of petrol, diesel engines, Domestic refrigerator – Vapour compression Refrigeration.

Industrial Safety practice & Protective Devices-General requirements- Eye and face protection.- Respiratory Protection - Head protection - Foot protection- Hand Protection.

<u>Note:</u> All the topics are to be taught / illustrated with product / component examples from domestic appliances (mixer, grinder, refrigerator, table, chair, cook wares, fan, bath tub, soap box, water tap, pin, clip), transports (bicycle, car, train, ship, aeroplane), Industrial components (gas stove burner, bolt, nut, window frame, gate, motor, pump, compressor, exhaust fan, nail, keys, table weight), etc

Assignments with power point presentation in other related topics like (not included for terminal examinations)

Different modes of heat transfer, Boilers, Pumps, Thermal, Wind, tidal, geothermal nuclear, Gas turbine power plants, Energy conservation, Alternate fuels, cryogenics, drilling operations, milling operations and surface finishing operations, Additive manufacturing.

Text Book

- 1. Basic Mechanical Engineering Lecture notes by Dept. of Mechanical Engg., TCE,.
- 2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 1996.
- 3. Prabhu.T.J, Jai Ganesh. V and Jebaraj.S, 'Basic Mechanical Engineering', Scitech Publications, Chennai, 2000.

Reference Books

- 1. Bhandari V B, "Design of Machine Elements", Tata McGraw hill Publications, Second edition, 2009.
- 2. Hajra Choudhury. S.K, Hajra Choudhury. A.K, Nirjhar Roy, "Elements of Workshop Technology", Vol. 1, Media Promoters, 2009.
- 3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, 2000.
- 4. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.

Course Contents and Lecture Schedule

Module No.	Торіс	No. of Lectures
1.0	History and evolution of Mechanical Engineering	1
2.0	Steps of design procedure – Materials for engineering components, stress, strain, Factor of safety	2
2.1	Transmission systems- Belt and gear drives	1
3.0	Manufacturing processes	
3.1	Types of manufacturing industries and manufacturing systems, foundry - green sand mould casting	1
3.2	Metal forming - forging, rolling, extrusion, drawing,	2
3.3	Metal joining – Resistance Arc and Gas welding	1
3.4	Metal machining (construction and operation only) - lathe	2
3.5	Metal finishing- Surface grinding	1
4.0	Energy resources - renewable, non renewable	1
4.1	Prime movers- Types and applications.	1
4.2	Internal Combustion Engine- Working of petrol, diesel engines	2
4.3	Domestic refrigerator – Vapour compression Refrigeration	1
5.0	Industrial Safety Practice & Protective Devices	1
6	Assignments with power point presentation	5
	Total no. of periods	22

Course Designers:

- 1. Dr. M. Kathiresan
- 2. Mr. M. S. Govardhanan

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14ES160BASICS OF ELECTRICAL AND
ELECTRONICS ENGINEERINGCategory L T P Credits
ES 2 0 0 2

A. BASICS OF ELECTRICAL ENGINEERING

Preamble

It is an introductory course which emphasize the fundamental concepts and overview of Electrical Engineering. The concepts discussed herein are intended to provide clarification on basic electrical engineering for beginners of all engineering graduates. **Prerequisite**

NIL

Course Outcomes

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

CO1 CO2	Explain the evolution of electricity and list the inventors. Explain the basic electrical quantities and laws.	Remember Understand
CO3	Explain the types of electrical equipment, machines and its applications.	Understand
CO4	Show the tariff for a given load and energy consumption.	Understand
CO5	Explain the electrical safety issues and protective devices.	Understand
CO6	Explain the roles of authorities governing Indian Electricity.	Understand
CO7	Explain the concept of renewable and non renewable resources of power generation systems.	Understand

Assessment Pattern

Bloom's Catagory	Co	Terminal		
BIOOIII'S Calegory	1	2	3	Examination
Remember	10	10	Through Assignment	10
Understand	40	40	and Seminar	40
Apply	0	0		0
Analyse	0	0		0
Evaluate	0	0		0
Create	0	0		0

Course Level Assessment Questions

Course Outcome 1:

- 1. Name the invention of Benjamin Franklin in 1747.
- 2. List the names of inventors of electrical quantities.
- 3. Write the year of installation of first hydro electric power plant.

Course Outcome 2:

- 1. State Ohm's Law.
- 2. Define Power & Energy.
- 3. Differentiate DC and AC supply.

Course Outcome 3 :

- 1. List the types of electric machines.
- 2. Name the types of analog meters for measuring current & voltage.
- 3. List the applications of induction motor.

Course Outcome 4 :

- 1. Show the energy consumed per year by a load of 60 W operated for 5 hours a day.
- 2. Write the expression relating power and energy.
- 3. State the need of star rating for equipment.

Course Outcome 5:

- 1. Distinguish between circuit breaker and lightning arrester.
- 2. List the various types of electrical hazards.
- 3. List the few electrical safety devices.

Course Outcome 6 :

- 1. List the various authorities governing Indian electricity.
- 2. List the activities of TEDA.
- 3. State the role of Central Electricity Regulatory Commission.

Course Outcome 7 :

- 1. State the significances of renewable power generation.
- 2. List the sources of renewable power.
- 3. State the limitation of non renewable power generation.

Concept Map



Syllabus

History of Electricity

Evolution of Electricity and Electrical inventions.

Fundamentals of Electricity

Electrical quantities- Charge, Electric potential, voltage, current, power, energy, DC, AC, time period, frequency, phase, flux, flux density, RMS, Average, Peak, phasor & vector diagram.

Electric Circuits - Passive components (RLC), Ohm's law, KCL, KVL, Faraday's law, Lenz's law.

Electrical materials – Conducting and insulating materials.

Measuring Instruments – Analog and Digital meters – Types and usage.

Electrical Machines & Equipment- Types, Specifications and applications.

Power rating and Energy calculation – for a sample load (domestic loads). Energy Efficient equipment – star ratings.

Protection & Safety - Hazards of electricity - shock, burns, arc-blast, Thermal Radiation, explosions, fires, effects of electricity on the human body. Electrical safety practices, Protection devices.

Indian Electricity Scenario

Electric Power- Generation resources, Transmission types & Distribution system (levels of voltage, power ratings and statistics)

Regulatory Authorities governing Indian Electricity - Roles of : MNRE,NTPC, NPCIL PGCIL, APTEL, <u>CERC</u>, SERC, CTU, STU, NLDC, RLDC,SLDC, RFO,BEE,TNEB, IREDA,TEDA.

Text Book

1. Basics of Electrical Engineering – Lecture Notes, Dept. of EEE, TCE, Madurai.

Course Contents and Lecture Schedule

Module No.	Торіс	No. of Lectures
1.	History of Electricity	
1.1	Evolution of Electricity and Electrical inventions.	2
2.	Fundamentals of electricity	
2.1	Electrical quantities- Charge, Electric potential, voltage,	2
	current, power, energy, DC,AC, time period, frequency, phase,	
	flux, flux density, RMS, Average, Peak, phasor & vector	
	diagram.	
2.2	Electrical circuits - Passive components (RLC), Ohm's law,	1
	KCL, KVL, Faraday's law, Lenz's law.	
2.3	Electrical materials – Conducting and insulating materials.	1
2.4	Measuring Instruments- Analog and Digital meters – Types	1
	and usage	
2.5	Electrical Machines & Equipment - Types, Specifications	2
	and applications.	
2.6	Power rating and Energy calculation – for a sample load	1
	(domestic loads). Energy Efficient equipment – star ratings.	
2.7	Protection & Safety - Hazards of electricity - shock, burns,	2
	arc-blast, Thermal Radiation, explosions, fires, effects of	
	electricity on the human body. Electrical safety practices,	
2	Protection devices.	
3.	Indian Electricity Scenario	0
3.1	Electric Power- Generation resources, Transmission types &	Z
	distribution system (levels of voltage, power ratings and	
2.2	Statistics). Bogulatory Authorities governing Indian electricity Polos	2
5.2		Z
	STU NINC, REDC SLOC REC REE TNER IREDA TEDA	
4	Assignments/Seminars:	6
	Evolution of Electrical Engineering, Electrical Equipment,	
	Machines and its applications, Energy tariff calculation, Power	
	generation, Protection devices, Indian Electricity Governance.	00
	lotal	22

Course Designers:

- 1. Mr.B.Ashok Kumar
- 2. Dr.S.Charles Raja
- 3. Mr.G.Sivasankar
- 4. Mr.V.Seetharaman

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B.BASICS OF ELECTRONICS ENGINEERING

Preamble

Basic Electronics is a primary course for all engineering students. The course work aims in imparting fundamental knowledge on electronic components and communication engineering concepts. The objective of this course is to help students acquire knowledge in real life applications.

Prerequisite

NIL

Course Outcomes

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

CO1: Understand the basic electronic components

CO2: Identify Frequency Spectrum and Applications

CO3: Explain the operation of Communication blocks

CO4:Understand the applications of Electronics and Communication Understand

Understand

Applv

Understand

devices

Assessment Pattern

Bloom's	Conti	nuous <i>I</i> Tes	Terminal		
Category	1	2	3	Examination	
Remember	30	20	Assignment	15	
Understand	20	30	and	25	
Apply	0	0	Seminar	10	
Analyse	0	0		0	
Evaluate	0	0		0	
Create	0	0		0	

Course Level Assessment Questions

Course Outcome 1 (CO1):

- 1. Differentiate Electrical and Electronics.
- 2. Explain the operation of Diodes and Transistors.

Course Outcome 2 (CO2):

- 1. Explain different configurations of Transistors
- 2. Identify the frequency spectrum for mobile communications.

Course Outcome 3 (CO3):

- 1. Describe the operation of communication transceivers
- 2. Specify the types of communication systems.

Course Outcome 4 (CO4):

- 1. List different Real time Electronics Products.
- 2. Explain the concept behind satellite communication



Syllabus

Electronics

Electrical Vs Electronics, Electronic products and systems, Electronic Devices (Diode – Forward bias, reverse bias, Transistor (CE, CB, CC)), Electronic components, Electronic Circuit (Rectifier, Regulator & IC), Amplifiers and Oscillators

Communication

Frequency spectrum and applications, Types of Communication systems (analog Vs digital, wire –optical, wireless, satellite), Communication system Block diagram (Transmitter and Receiver)

Applications

Mobile Phones, Laptop, Satellite, Microwave Oven – Qualitative Approach.

Text Book

1. Basic Electronics and Communication Engineering – Lecture Notes, Dept. of ECE, TCE, Madurai.

Reference Books

- 1. Albert Paul Malvino," Electronic Principles", Tata Mcgraw Hill, 2002
- 2. Simon Haykin, "Communication Systems", Wiley Eastern, Third Edition, 1996
- 3. Faculty of Network Institutions, "Analog electronics", Project Network Engineering Series, 2004
- 4. Simon Haykin, Barry Van Veen," Signals and Systems", Wiely, 2nd Edition, 2002

Course Contents and Lecture Schedule				
Module No.	Торіс	No. of Lectures		
1.	Electronics			
1.1	Electrical and Electronics Principles	1		
1.2	Electronic products and systems	1		
1.3	Electronic Devices – Diodes and Transistors	1		
1.4	Transistor Configuration CE,CB and CC	1		
1.5	Electronic Circuits – Rectifier, Regulator & IC	1		
1.6	Amplifiers and Oscillators	2		
2.	Communication			
2.1	Frequency spectrum and applications	1		
2.2	Types of Communication systems	1		
2.3	Communication system Block diagram	1		
2.4	Transmitter	1		
2.5	Receiver	1		
3.	Applications -Qualitative Approach.			
3.1	Mobile Phones	1		
3.2	Laptops	1		
3.3	Satellite	1		
3.4	Microwave Oven	1		
	Total	16		

Course Contents and Lecture Schedule

Course Designers:

- 1. Dr.S. Raju
- 2. Dr.R. Sukanesh
- 3. Dr.M. Suganthi
- 4. Dr.M.S.K. Manikandan
- 5. Dr.D. Gracia Nirmala Rani

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14ME170	ENGINEERING GRAPHICS	Category	L	Т	Ρ	Credit
		ES	2	0	2	3

Preamble

Engineering Graphics is referred as language of engineers. An engineer needs to understand the physical geometry of any object through its orthographic or pictorial projections. The knowledge on engineering graphics is essential in proposing new product through drawings and interpreting data from existing drawings. This course deals with orthographic and pictorial projections, sectional views and development of surfaces.

Prerequisite NIL

Course Ou	Itcomes	
On success	sful completion of the course, students will be able to	
CO1:	Draw the orthographic projections of points, straight lines, plane surfaces and solids.	Apply
CO2:	Draw the orthographic projections of sectioned solids and true shape of the sections.	Apply
CO3:	Develop lateral surfaces of the uncut and cut solids.	Apply
CO4:	Draw the pictorial projections (isometric and perspective) of simple solids.	Apply
CO5:	Sketch by free hand the orthographic views from the given pictorial view.	Apply

Assessment Pattern

Bloom's	Co Asses	ontinuo ssment	Terminal	
Calegory	1	2	3	Examination
Remember				
Understand				
Apply	100	100	100	100
Analyse				
Evaluate				
Create				

Course Level Assessment Questions

Course Outcome 1: Students will be able to draw the orthographic projections of points, straight lines, plane surfaces and solids.

- 1. Draw the projection of points on a common reference line. Take 20 mm distance between the projectors.
 - 1. Point K is 10 mm above H.P. and 25 mm in front of V.P
 - 2. Point L is 10 mm above H.P. and on the V.P
 - 3. Point *M* is 25 *mm* below *H*.*P*. and 20 *mm* behind *V*.*P*
 - 4. Point N is 20 mm below H.P. and 20 mm in front of V.P
 - 5. Point O is on the reference line.
 - 6. Point P is on both H.P. and V.P

- 2. A line RS, 80 mm long has its end R, 20 mm above HP and 30 mm in front of VP. The top and front views of the line have the lengths of 50 mm and 65 mm respectively. Draw the projections of the line and find its true inclinations with HP and VP.
- 3. A thin rectangular plate of sides 60 mm x 30 mm has its shorter side in the V.P and inclined at 30⁰ to the H.P. Project the top view oh plate, if its front view is a square of 30 mm side.
- 4. Draw the projections of a pentagonal prism of base side 30 mm and axis length 60 mm when it lies on the ground on one of its rectangular faces with its axis inclined at 35° to V.P and parallel to H.P.

Course Outcome 2: Students will be able to draw the orthographic projections of sectioned solids and true shape of the sections.

- 1. A square pyramid of base 40 mm side and axis 65 mm long has its base on the ground and all the base edges equally inclined to V.P. It is cut by a section plane, perpendicular to V.P, inclined at 45[°] to H.P and bisecting the axis. Draw the elevation, sectional plan and true shape of the section.
- 2. A cube of 35 mm side is resting on ground on one of its faces with a vertical face inclined at 30[°] to VP. It is cut by a cutting plane perpendicular to HP and inclined at 60[°] to VP so that a face which makes 60[°] angle with VP is cut into two equal halves. Draw the sectional elevation, plan and true shape of the section.
- 3. A cone of 60 mm base circle diameter and axis height 70 mm is resting on HP with a point on its circumference such that the generator containing that point is perpendicular to HP. The cone is cut by a plane parallel to HP and perpendicular to VP bisecting the axis. Draw the elevation and sectional plan.

Course Outcome 3: Students will be able to develop lateral surfaces of the uncut and cut solids.

- 1. A pentagonal pyramid of base 50 mm side and axis 75 mm long has its base on the ground. It is cut by a section plane, perpendicular to V.P, inclined at 30[°] to H.P intersecting the axis at 40 mm from apex. Draw the development of the lateral surface of its lower portion.
- 2. A hexagonal prism of 45 mm side and axis height 70 mm is resting on ground with its base. It is cut by i) a horizontal cutting plane at 25 mm from base and ii) a cutting plane inclined to HP at 35⁰ passing through a point on the axis at 20 mm from its top. Draw the development of the lateral surface of its middle portion.
- 3. A cylinder of 70 mm base diameter and axis height 90 mm is resting on HP with its base. It contains a circular through hole of 30 mm diameter on its periphery, with the axis of hole parallel to HP and perpendicular to VP, bisecting the cylinder axis. Draw the development of the cylindrical surface.

Course Outcome 4: Students will be able to draw the pictorial projections (isometric and perspective) of simple solids.

- 1. Draw the isometric view of a pentagonal pyramid of base side 32 mm and height 75 mm when its base is parallel to HP with one of its base edges parallel to VP. The vertex is below the base.
- 2. Draw the isometric projection of a hexagonal prism of base side 30 mm and height 70 mm when it lies on the ground with one of its face edges and axis parallel to HP and VP.
- 3. A regular hexagonal pyramid of base edge 30 mm and height 50 mm rests on its base on the ground plane with one of its base edges touching the picture plane. The station point is 40 mm above the ground plane and 50 mm in front of PP. The central plane is 35 mm to the right of the axis. Draw the perspective projection of the pyramid. A cylinder of diameter 40 mm and height 50 mm rests on GP on one of its ends with its axis 40 mm behind the picture plane. The station point is 50 mm to the

right of the axis. The station point is 70 mm above the GP and 45 mm in front of PP. Draw the perspective view of the cylinder.

Course Outcome 5: Students will be able to sketch by free hand the orthographic views from the given pictorial view.

1. Draw the front view, top view and left side views of the given block from its pictorial view.



2. Draw the orthographic projections for the given object.



3. Draw the Elevation, Plan and Right side view for the given shaft bracket.





Introduction- Importance of graphics in engineering applications – Use of drafting instruments -Size, layout and folding of drawing sheets - BIS Standards – Lettering and dimensioning, construction of polygons.

Orthographic projections - Introduction - Principles -Principal planes-First angle projection. **Projection of points** located in all quadrants. **Projection of straight lines** inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method, traces. **Projection of planes** (regular polygonal and circular surfaces) inclined to both the principal planes by rotating object method. **Projection of regular solids*** by rotating object method when the axis is inclined to one of the principal planes. **Projection of sectioned solids** and true shape of the sections (Axis of the solid perpendicular to HP). **Development of lateral surfaces** of regular* and sectioned solids.

Pictorial Projections – Introduction - **Isometric projection** – Principle, isometric scale, Isometric projections of regular solids* when the axis is i) perpendicular to HP ii) perpendicular to VP (iii) parallel to both HP and VP. **Perspective projection** - Principle, perspective projection of regular solids* when the axis is perpendicular to i) Ground Plane ii) Picture plane by visual ray method. **Free hand sketching** of multiple orthographic views from single pictorial view of objects. **Introduction to drafting packages** and demonstration. (Not for examination). (*prisms, pyramids, cylinder and cone).

Text Book

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

Reference Books

- 1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
- 2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008
- 3. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
- 4. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

SI.No	Торіс	Lecture Hrs (Periods)	Practical Hrs (Pariods)
1	Introduction- Importance of graphics in engineering applications – Use of drafting instruments -Size, layout and folding of drawing sheets – BIS Standards - Lettering and dimensioning, construction of polygons.	2	3
2	Orthographic projection - Introduction - Principles -Principal planes-First angle projection, Projection of points located in all quadrants.	2	3
3	Projection of straight lines inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method, traces.	4	6
4	Projection of planes (regular polygonal and circular surfaces) inclined to both the principal planes by rotating object method.	4	6
5	Projection of regular solids (prisms, pyramids, cylinder and cone) when the axis is inclined to one of the principal planes by rotating object method.	4	6
6	Projection of sectioned solids and true shape of the sections (Axis of the solid perpendicular to HP)	2	3
7	Development of lateral surface of regular and truncated solids.	2	3
8	Isometric projection – Principle, isometric scale, Isometric projections of regular solids when the axis is i) perpendicular to HP ii) perpendicular to VP (iii) parallel to both HP and VP.	2	3
9	Perspective projection - Principle, perspective projection of regular solids when the axis is perpendicular to i)Ground Plane ii) Picture plane by visual ray method.	2	3
10	Free hand sketching of multiple orthographic views from pictorial view of objects.	2	3
11	Introduction to drafting packages and demonstration.	2	-
	Test	20	3

Course Contents and Lecture Schedule

Question Number	Description	Туре	Marks
1	Projection of Points (OR) Free hand sketching of orthographic views from pictorial views	Either or	10
2	Projection of lines	Either or	15
3	Projection of planes	Either or	15
4	Projection of solids	Either or	15
5	Section of solids	Either or	15
6	Development of surfaces	Either or	15
7	Isometric Projection (OR) Perspective projection	Either or	15
		Total	100

Question Pattern for Terminal Examination

<u>Note:</u> 1. Plates (Drawing sheets) submitted by students will be considered for internal assignment marks (30).

2. One test will be conducted locally by respective faculty-in-charge during regular class hours for internal test marks (20).

1. Terminal examination will be conducted centrally by the office of controller of examinations.

Course Designers:

1. Mr.A.Samuel Raja

2. Mr.M.Kannan

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14PH180	PH180 PHYSICS LABAROTARY		L	Т	Ρ	Credit
		BS	0	0	2	1

Preamble

The course aims in imparting fundamental knowledge of experimental Physics. The error analysis is essential for understanding and analyzing the results of any experiment. Basic experiments in thermal applications and optics are introduced. Characteristics and uses of Laser & fiber optics have been included. The outcome of the course is to help students determine physical constants, Viscosity, Band gap, wavelength of a Laser and Acceptance angle of a fiber.

LIST OF EXPERIMENTS

- 1. Error analysis
- 2. Compound pendulum- acceleration due to gravity
- 3. Poiseulle's flow method-viscosity determination
- 4. Solar cell characteristics
- 5. Plank's constant determination
- 6. Energy band gap of junction diode
- 7. Spectrometer dispersive power of the prism
- 8. Microscope- thickness of wire by air wedge
- 9. Laser- particle size and wavelength determination
- 10. Fiber optics –numerial aperture & acceptance angle determination

Course Designers:

- 1. Dr. R.Vasuki rvphy@tce.edu
- 2. Mr. A.L.Subramaniyan alsphy@tce.edu
- 3. Mr. D.Ravindran drphy@tce.edu

14CH190 CHEMISTRY LABORATORY

Category	L	Т	Ρ	Credit
BS	0	0	2	1

Analyse

Preamble

The objective of this course is to develop the intellectual and psychomotor skills of the students by imparting knowledge in material, quantitative and electrochemical analysis.

Course Outcomes

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

•	Analyse the material qualitatively	Analyse
•	Estimate the chemical parameters of water	Apply

Calculate the strength of acids, oxidizing and reducing agents

List of Experiments 1. Material analysis

- i) Analysis of Boiler scale
 - ii) Analysis of Cement
 - iii) Analysis of alloy sample

2. Quantitative analysis

- i) Estimation of Total Hardness of water sample
- ii) Estimation of Ca²⁺ and Mg2+ individual hardness of water sample
- iii) Estimation of Alkalinity of water sample
- iv) Estimation of Chloride in a water sample
- v) Estimation of COD

3. Electrochemical analysis

- i) Conductometry Titration (Strong acid Vs Strong base, Mixture of acids Vs Strong base)
- ii) Potentiometric redox Titration (K₂Cr₂O₇ Vs FAS, KMnO₄ Vs FAS)

Course Designers:

- 1. Dr.Mrs.k.Radha
- 2. Dr.S.Balaji
- 3. Dr.V.Velkannan
- 4. Dr.S.Sivailango

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