# Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)



## **Course Contents (Syllabus) for**

First Year B. Tech. (All Programs) Sem - I to II

## AY 2020-21

Title of	itle of the Course: 5PH 101 Engineering Physics													L 3	Т	Р	Cr
Pre-Red	quisite Co	urses:	Stude	ents a	re ex	pecte	d to k	now	the ba	asic co	oncer	ot in P	'hysic	s.	-	-	5
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CO2	applications.Image: Constraint of the second se												nding				
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	_	CO1	2														
	F	CO2	2														
		CO3	2														

#### Assessments:

**Teacher Assessment:** Two components of In-Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

**ISE-1** and **ISE-2** are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

**ESE:** Assessment is based on 100% course content with 70-80% weightage for course content (Normally last three modules) covered after MSE.

Course Contents:	
Module 1: Optics	7Hrs
Introduction, types of optics, diffraction, types of diffraction, Fresnel's diffraction: Fresnel's half period zones, zone plate, diffraction at straight edge. Fraunhofer's diffraction: diffraction due to single slit, double slits, plane diffraction grating. Polarization: optical activity, specific rotation of optical active substances, Laurent's half shade polarimeter.	
Module 2: Quantum Physics	7Hrs
Introduction, black body radiation, Planck's quantum theory, Wien's displacement law and Rayleigh – Jeans law, phase velocity, group velocity and particle velocity, de-Broglie's hypothesis, Compton effect: theory and experimental verification, Heisenberg's uncertainty principle and its applications, wave function and its physical significance, Schrödinger's wave equation: time independent and time dependent, applications of Schrödinger's wave equation.	
Module 3: Ultrasonics	7Hrs
Introduction, classification of sound, ultrasonic waves, generation of ultrasonic waves (Magnetostriction and Piezoelectric method), detection of ultrasonic waves by Kundt's tube, thermal detection and sensitive flame method, velocity of ultrasonic waves in liquid, applications of ultrasonic waves in scientific and engineering field.	
Module 4: Solid State Physics	6Hrs
Introduction, formation of energy bands in solid, classification of solid on the basis of band theory, number levels in band, density of states, Fermi-Dirac statistics, Fermi level, variation of Fermi level with change in temperature for semiconductor, electrical conductivity of metal and semiconductor, Hall effect, basic concept of p-n junction.	
Module 5: Gravitation and Central Force Motion	8Hrs
Law of gravitation, Gravitational potential energy, Inertial and gravitational mass, Potential and field due to spherical shell and solid sphere, Motion of a particle under a central force field, Two body problem and its reduction to one-body problem and its solution, The energy equation and energy diagram, Kepler's Laws, Satellite in circular orbit and applications, Geosynchronous orbits.	
Module 6: Computer Instrumentation	6Hrs
Introduction, instrumentations, measurement system, control system, Transducer and Sensor: transducers, sensors, classification of transducers, characteristics of transducers, selection criterion for transducers, temperature transducers, strain gauge, pressure transducers, force transducers, optical transducers, actuators.	

## Module wise Measurable Students Learning Outcomes :

## After the completion of the course the student should be able to:

- Module-1: Describe Fresnel's and Fraunhofer type diffraction, polarization and applications in technological field.
- Module-2: Use the concepts of quantum mechanics and apply for solving the problems.
- Module-3: Acquire the knowledge of ultrasonic waves and implement in various fields.
- Module-4: Explain the formation of bands in solid and acquire the knowledge of fermi level, electrical conductivity, Hall Effect and formation of p-n junction.
- Module-5: Discuss two body problem, energy equation and diagram, Kepler's law.
- Module-6: Distinguish between sensors and transducers, and use in the proper system for controlling the desired physical quantities.

Title o	of th	e Cou	rse: Er	ngineer	ing M	athema	tics –I				L	Т	'	Р	Cr
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Pre-R	equ	isite C	ourses:												
Textbo	ook	s:													
1.	"/	Text	Book c	of Appl	ied Ma	athemati	ics, Vo	ol I and	l II", P.	N. ar	d J. N. V	Wartika	ır, Vi	dyarthi	Griha
2	Pra	ikashar Tahar T	n, Pune,	, 2006. ring M	stha" I		orrol I	Zhonno	Dublic	ation	2005 20	th Editi	~ **		
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Refere	ence	es:									<b>-</b>		~		10-0
1.	"A	dvance	ed Engr	neering	Mathe	ematics	", Erw	in Krey	vszig, W	/iley l	Eastern L	Imited	Publi	ication	, 1978,
2	1St "⊿	. Ealtio dvance	on od Fnai	nooring	r Math	omatics	." W	vlie C	R Tate	a Mc(	Graw Hi	ll Puhl	icatio	n 100	99 Sth
2.	Edition.														
3.	3. <i>Advanced Engineering Mathematics</i> ", H. K. Dass, S. Chand & Company Ltd., 1988, 1 <sup>st</sup> Edition.														
Cours	e O	bjectiv	es :												
1.	То	develo	op math	ematica	al skills	s and en	hance	thinkin	g powe	r of st	udents.				
2.	To	introd	uce fun	dament	al conc	cepts of	mathe	matics	and the	ir appl	ications	in engiı	neerin	ng field	ls.
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	level Descriptor														
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		CO1	2												
		CO2	2												
Assess	me	nts •													
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				MSE							30				
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ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

## **Course Contents:**

<b>Module 1 : Matrices:</b> Rank of matrix, Homogeneous and non-homogeneous linear equations, symmetric and skew symmetric and orthogonal matrices, Eigen values, Eigen vectors, Cayley Hamilton theorem, Diagonalisation of matrices.	6Hrs.
Module 2: Calculus:	
Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorem with remainders, L'hospital rule and indeterminate forms	6Hrs.
<b>Module 3: Complex Number:</b> Polar form of complex number, Argand's diagram, De Moiver's theorem, roots of complex number, Hyperbolic function, exponential form of complex number, relation between circular and hyperbolic function.	7Hrs.
<b>Module 4: Partial Differentiation and its application</b> : Partial derivative, chain rule for partial differentiation, Euler's theorem for homogeneous and non-homogeneous function, Jacobian, Error and approximation, maxima and minima of function of two variables.	8Hrs.
Module 5: First order ODE and its application:	8Hrs.
applications to simple electric circuit.	
Module 6: Curve tracing: Tracing of curves for Cartesian and polar coordianate.	5Hrs.

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Pre-Re	equisite Courses	: Physic	cs															
Textbo	ooks:																	
1. Ram	amrutham., S. "Z	Textboo	k of	f Ap	plie	ed M	echa	anics	s", I	Dha	npa	t Rai	Publisl	hing C	lompa	ny I	Limited,	, 2008.
2. Bhay	vikatti., S. S. and	Rajash	eka	rapp	pa.,	K. (	3. "I	Engi	neer	ring	g Me	echan	ics", N	lew Ag	ge Int	erna	tional	
Publ	ishers, 2015, 5 <sup>th</sup> 1	Edition																
3. Khu	rmi. R. S., "Textl	book of	`App	plie	d M	echa	inics	s", 1	Гata	Mc	Gra	w Hi	ll Publi	ishing	Com	bany	, 2013,	$20^{\text{th}}$
Rev	ised Edition.																	
Refere	nces:																	
1. Bee	r, F. P. and Johns	ston, E.	R.	"Ve	ector	r Me	cha	nics	for	Eng	gine	ers V	ol. I an	nd II",	McG	raw	Hill Co	mpany
Pub	lication, 2011, 9 <sup>tt</sup>	<sup>h</sup> Editio	n.								-							
2. Sing	ger, F. L. "Engin	eering I	Mec	char	nics	Stat	ics c	& D	vnar	nics	s". I	3. S. I	Publica	ations.	2011			
3. Tim	oshenko. S. and	Youn	g. I	D. I	H. '	'Eng	einee	ering	e M	ech	anio	cs". I	McGra	w Hil	l Cor	npar	nies. 20	08. 4 <sup>th</sup>
Edi	tion.	•	,0			Ĺ	,	Ċ	)			,				1	,	,
4. Me	riam. L. and L.C	J. Krai	ge.	<i>"E</i>	ngin	eeri	ng N	Mech	hani	cs -	– D	vnam	ics" I	ohn V	Vilev	& S	Sons. 20	)02. 6 <sup>th</sup>
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2.	To illustrate beh	avior of	f sta	atic	bod	ies ı	ising	2 me	cha	nics		ncept	5.	loonun	ieur e		eenng.	
3.	To provide know	owledge	e o	of n	noti	ons,	for	ces	and	l w	vork	ener	rgy pr	inciple	es an	d it	ts engin	neering
	applications.	U				,							0, 1	1			U	U
Course	e Learning Outc	omes:																
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CO1	Apply laws and	l basic	con	cep	ts of	f me	char	nics	of r	igid	bo	dies.			II	J	Jndersta	anding
CO2	Analyze system	n of for	ces	<u>in S</u>	Stati	cs a	nd E	)yna	mic	s.					IV	A	Analyzin	g
CO3	Apply concept	of mec.	han	ics	to so	olve	eng	inee	ring	, pro	oble	ms.			III	I	Applying	g
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		CO2	3	2			-											
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three modules) covered after MSE.	
Course Contents:	
Module 1: Equilibrium of Forces	Hrs.
Fundamental concepts and axioms, Types of Force Systems, Composition and resolution of	
forces, Moment of a force, Couple, Resultant of planar force systems. Equilibrium of forces-	
Free body diagrams, Equations of equilibrium, Equilibrium of planar systems, Equilibriums of	8
beams- Types of loads and supports. Friction-Laws of friction, equilibrium of bodies on	
inclined plane, applications- problem involving wedges, ladders etc.	
Module 2: Virtual work and Moment of inertia	Hrs.
Principle of Virtual work- applications to statically determinate simple and compound beams.	6
Centre of gravity and Centroid, Moment of inertia, Radius of gyration, Mass-Moment of inertia.	U
Module 3: Analysis of plane frames	Hrs.
Pin-jointed statically determinate plane trusses- Assumptions, imperfect, perfect and redundant	
trusses, Analysis of statically determinate trusses, method of joints, method of sections and	6
graphical method.	
Module 4: Kinematics of particles	Hrs.
Rectilinear motion of a particle under uniform and variable acceleration, Equations of motion,	
Motion under gravity, Relative motion, Motion of a projectile, Curvilinear motion of a particle,	7
Relation between linear and angular motion.	
Madula 5. Vinctics of norticles	тт
Module 5: Kinetics of particles	Hrs.
Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough	Hrs.
Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and	Hrs.
Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and	Hrs.
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Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.	Hrs. 7
Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation. Module 6: Kinetics	Hrs. 7 Hrs.
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Module 5: Kinetics of particlesNewton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.Module 6: KineticsWork energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.	Hrs. 7 Hrs. 6
Module S: Knetics of particlesNewton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.Module 6: KineticsWork energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.Module wise Measurable Students Learning Outcomes :	Hrs. 7 Hrs. 6
Module 5: Kinetics of particles         Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.         Module 6: Kinetics         Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.         Module wise Measurable Students Learning Outcomes :         After the completion of the course the student should be able to:	Hrs. 7 Hrs. 6
Module S: Kinetics of particles         Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.         Module 6: Kinetics         Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.         Module wise Measurable Students Learning Outcomes :         After the completion of the course the student should be able to:         1. Apply fundamental knowledge of engineering mechanics for rigid bodies under system of the course the student should be able to:	Hrs.     7     Hrs.     6
<ul> <li>Nodule 5: Kinetics of particles</li> <li>Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.</li> <li>Module 6: Kinetics</li> <li>Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.</li> <li>Module wise Measurable Students Learning Outcomes :</li> <li>After the completion of the course the student should be able to: <ol> <li>Apply fundamental knowledge of engineering mechanics for rigid bodies under system of for analysis of beams. Evaluate various sectional properties</li> </ol> </li> </ul>	Hrs.         7         Hrs.         6         Forces.         such as
<ul> <li>Notice 5: Knetics of particles</li> <li>Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.</li> <li>Module 6: Kinetics</li> <li>Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.</li> <li>Module wise Measurable Students Learning Outcomes :</li> <li>After the completion of the course the student should be able to: <ol> <li>Apply fundamental knowledge of engineering mechanics for rigid bodies under system of for analysis of beams. Evaluate various sectional properties centre of gravity, moment of inertia etc.</li> </ol> </li> </ul>	Hrs.       7       Hrs.       6       Forces.       such as
<ul> <li>Notice S: Knetics of particles</li> <li>Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.</li> <li>Module 6: Kinetics</li> <li>Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.</li> <li>Module wise Measurable Students Learning Outcomes :</li> <li>After the completion of the course the student should be able to: <ol> <li>Apply fundamental knowledge of engineering mechanics for rigid bodies under system of for analysis of beams. Evaluate various sectional properties centre of gravity, moment of inertia etc.</li> <li>Analyse various types of statically determinate pin jointed trusses with analytical as</li> </ol> </li> </ul>	Hrs.         7         Hrs.         6         Corces.         such as         well as
<ul> <li>Notice 5: Kinetics of particles</li> <li>Newton's laws of motion, D'Alemberts principle. Rectilinear motion- Motion on a rough inclined plane, motion of a lift, motion of connected bodies, Circular motion- Centripetal and centrifugal force, motion of a bicycle, Car along a curved track, super elevation of roads and railway curves, Kinetics of rotation-Torque, mass moment of inertia, problems on centroidal and non centroidal rotation.</li> <li>Module 6: Kinetics</li> <li>Work energy method- potential energy, kinetic energy, law of conservation of energy. Impulse momentum method. Collisions- impact, collision of bodies, coefficient of restitution, loss of kinetic energy due to impact.</li> <li>Module wise Measurable Students Learning Outcomes :</li> <li>After the completion of the course the student should be able to: <ol> <li>Apply fundamental knowledge of engineering mechanics for rigid bodies under system of for analysis of beams. Evaluate various sectional properties centre of gravity, moment of inertia etc.</li> <li>Analyse various types of statically determinate pin jointed trusses with analytical as graphical methods.</li> </ol> </li> </ul>	Hrs.         7         Hrs.         6         Forces.         such as         well as
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- recognition of the importance of safety in phases of engineering design and practice.
- 6. Analyze the impact of work power and energy on engineering problems.

Title of	f the Cour	se: Eng	glisł	n for	· Pro	ofess	sion	al C	om	mur	nicat	tion			L		Т	Р	Cr
Course	Code : 5H	<b>IS101</b>													2		1	0	3
Pre-Re	quisite Co	ourses:	Hi	ghe	r Se	con	dar	y Le	vel										
Textbo	oks:																		
Refere	nces:																		
1. K.R.La	axminaraya	nan, Eng	glish	for	Tech	nnica	l Co	тт	unic	atio	n, Sc	itech,	Sixth E	dition,	200	8			
2. Willia	m Sanborn	Pfeiffer	,T.\	/.S. F	Padn	naja	,Тес	hnic	al Co	omn	nuni	cation	: A Pra	ctical A	ppr	oach,	Pearso	n, Sixth E	dition
2012																			
3. A.K.Ja	ain, Praveen	Bhatia,	A.N	Л.Sh	aikh	, Pro	fess	iona	l Co	тт	unic	ation S	Skills, S	. Chand	an	d Co:	Fifth eo	20, lition	09
4. Ashra	f Rizvi <i>,Effe</i>	ctive Teo	chni	cal (	Com	muni	icati	on, ٦	Fata	Mc	Grav	v Hills	publisl	hing Co	mpa	any 20	006		
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6. Andre	ea J.Rutherf	ord,Phd	. Ва	isic (	Comi	muni	cati	on S	kills	for	Tech	nology	v, Pear	son Edu	ucat	ion A	sia,200	1	
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3. Acau	re basic pro	oficiency	in l	Engl	ish iı	nclud	ling	read	ling	and	liste	ening c	ompre	ehensio	n. w	riting	and sp	eaking sl	kills.
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three modules) covered after MSE.	
Course Contents:	
Module 1: Sentence Structure and Vocabulary Building	5 Hrs.
1. Subject Verb Agreement	
2. Modal verbs	
3. Question tags	
4. Connectives	
5 Synonyms, Antonyms, and Standard abbreviations	
6 Redundancies	
7 Misplaced Modifiers	
8 Passives	
Module 2 : Fundamentals of Communication	3 Hrs.
1. Features and Functions	
2 Importance of Communication	
3 The Communication Process	
4 Barriers and Breakdown of Communication	
5 Communication in an Organization	
i Unward communication	
ii Downward communication	
iii. Horizontal communication	
iv Diagonal communication	
v. Informal communication / Granevine communication	
Module 3 : Nature and Style of Writing	3.Hrs.
1. Describing	
2. Defining	
3. Classifying	
4. Providing examples or evidence	
5. Writing Introduction and Conclusion	
Module 4 :	2Hrs.
A. Non Verbal Communication	
1. Kinesics or Body Language	
2. Proxemics : Space Distance	
3. Haptic	
4. Vocalic : Paralinguistic features	
i. Pitch	
ii. Volume	
iii. Pauses	
iv. Rate of words/minute	
5.Chronemics	
6.Nonverbal Barriers	
B. Listening Skills	2Hrs.
1 Process of Listening	
2. Types of Listening	
3. Barriers to effective Listening	
	L
Module 5 :	4 Hrs.
A. Ural communication	1

1. Speeches for different Occasions ( Welcome Speech , Introductory Speech, Vote of	
Thanks Speech )	
2. Group Presentations	
3. Group Discussions	
4. Individual Presentations	
5. Job Interviews	
B. Basics of Phonetics	1 Hrs.
1. Improper Pronunciation	
2 Classification of Sounds in English	
3 Word Stress	
A Sentence Stress or Intonation	
5. Pronunciation and Articulation	
Module 6 · Writing Communication	2Hrs
A Basic Writing Skills :	21115.
1 Paragraph Writing	
2 Comprehension	
2. Escay Writing	
A Septence Structures	
4. Sentence Sciucities	
5. Use of prillases & clauses in sentences	
7. Creating cohorence	
7. Creating concretions the principles of percentage in documents	
8. Organising the principles of paragraphs in documents	
9. Techniques for writing precisely	211
B. Business Correspondence :	ZHrs.
1. Job Applications	
2. Complaint Letters and Adjustment Letters	
3. Inquiry and Order	
C. Official Correspondence :	2Hrs.
1. Memorandums	
2. Circulars	
3. Notices	
D .Report Writing :	2Hrs.
1. Individual Report	
2. Lab Report	
3. Inspection Reports	
Module wise Measurable Students Learning Outcomes :	
Module 1: Construct different types of sentences	
Module 2: Communicate effectively and avoid barriers	
Module 3: Understand the different styles of writing.	
Module 4: Demonstrate the advantages and limitations of non verbal Communication	
Module 5: Acquire proficiency in technical English and communicate confidently in different	
Formal situations.	
Module 6: Write effective paragraphs, reports, letters and practice written communication	
effectively.	
After the completion of the course the student should be able to:	
1. Enrich their Vocabulary.	
2. Improve their sentence structure.	
3. Communicate confidently in different formal situations	

 Tutorial: Computer Usage / Lab Tool :

 Language lab activities are conducted on computers

 Laboratory Experiences:

 1. Listening and reading skills improved

 2. Thinking and concentration are developed

 Independent Learning Experiences:

Students prepare for Seminars, presentations, Group Discussions and also Written Tests confidently.

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Desirable requirement	ts: Ba	asic c	cours	se of	softv	vare	and l	hardy	ware	prog	gramn	ning	•			
Textbooks:																
1. Byron Gottfried,	Schaun	n's, ''	Outli	ne of	Prog	gramı	ming	with	C", I	McG	raw-F	Hill, 7	Гhird	editio	n, 2017.	
2. Yashavant Kane	tkar, "L	et Us	s C",	BPB	B Pub	licati	on, F	Fiftee	nth e	editio	n, 201	16.				
3. E. Balagurusamy	/, "Prog	ramr	ning	in Al	NSI (	C", Ta	ata M	lcGra	aw-H	lill E	ducati	ion, S	Seven	th edi	tion, 201	.6.
References:							~ -	_				_				
1. Brian W. Kernig Second Edition,	ghan and 2015.	1 Der	nnis I	M. Ri	tchie	e, "Th	ne C I	Progr	amm	ning l	Langu	lage'	', Prei	ntice I	Hall of Ir	idia,
<b>Course Objectives :</b>																
• To imbibe an u	indersta	ndir	ng of	prog	gram	ming	<b>.</b>									
• To develop pro	blem-so	lving	g skil	ls to	transl	late te	ext de	escrit	bed p	roble	ems in	to pr	ograi	ns wr	itten usir	ıg
the Programmi	ng langi	lage	with	the l	nelp o	of lar	iguag	ge coi	nstru	cts.						
• To impart know	ledge o	n gei	neral	princ	ciples	s of co	ompu	iter la	ingu	ages	such a	as: co	onditio	onal b	ranching	, loops,
block structure	s, functi	ons,	and i	input	/outp	out.	-		-	-					-	-
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Assessments : Teacher Assessment:	PO CO1 CO2 CO3	1 Od 2 2 3	<b>7 Od</b> 1 1 2	£ Od	<b>PO4</b>	<b>5 Od</b>	9 Od	<b>b</b> 0 <b>1</b>	8 Od	PO 9	PO 10	PO 11	PO 12			
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ESE

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

50

Course Contents:	
Module 1: Introduction to Programming	Hrs.
Introduction to components of a computer system (disks, memory, processor, where a program is	
stored and executed, operating system, compilers etc.)	
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm:	4
Flowchart/Pseudocode with examples. From algorithms to programming Language: source	4
code, variables (with data types) variables and memory locations, Syntax and Logical Errors in	
compilation, object and executable code.	
Module 2: Arithmetic expressions, Precedence constraints, Conditional Branching & Loops	Hrs.
Arithmetic expressions & Precedence : Arithmetic, relational and logical operators, increment	
and decrement operators, conditional operator, bit-wise operators, assignment operators,	
expressions, type conversions, conditional expressions, precedence and order of evaluation	4
<b>Conditional Branching &amp; Loops:</b> Statements and blocks, if and switch statements, Loops-	
while, do-while and for statements, break, continue, goto and labels.	
Module 3: Arrays	Hrs.
Arrays- concepts declaration definition accessing elements storing elements arrays and	
functions two-dimensional arrays Character arrays Strings and applications of arrays	5
Module 4: Functions and Recursion	Hrs
Designing structured programs. Functions besize, perameter passing, call by value, idea of call by	1115.
reference, storage classes like extern, auto, register, static, scope rules, block structure, user defined	1
functions. Decursion with exemples	4
Module 5: Deinterg Structures and Union	Ung
Deinters, serverate initialization of neinten variables, neintens and function answerents	ПГ\$.
Pointers- concepts, initialization of pointer variables, pointers and function arguments,	
address arithmetic, Character pointers and functions, pointer to pointer.	-
Derived types: structures- declaration, definition and initialization of structures, accessing	5
structures, nested structures, arrays of structures, structures and functions, pointers to structures,	
self-referential structures, and unions.	
Module 6: Introduction to File handling	Hrs.
Input and output - concept of a file, text files and binary files, streams, standard I/O, Formatted I/O,	4
file I/O operations, error handling.	
Module wise Measurable Students Learning Outcomes :	
After the completion of the course the student should be able to:	
Module 1	
<ul> <li>grasp basics of representing problems into flow chart/pseudocode/algorithm.</li> </ul>	
• grasp the basics of programming languages.	
• convert simple algorithms to programs.	
Module 2:	
• grasp and formulate simple algorithms by using arithmetic expression and logical operators.	
• apply conditional branching, iterations to solve a problem using programming language.	
Module 3:	
• apply arrays to formulate algorithms and programs.	
• apply programming to solve matrix addition, multiplication problems and searching/ sorting pro-	oblems.
Module 4:	
• apply functions to decompose problems.	
• use recursive functions to solve problems.	
Module 5:	
apply pointers structures and union to formulate algorithms and programs	
Module 6.	
• grash fundamentals of file handling	
- Grasp randamentais of the nanofilig.	

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Pre-Re	equisite Courses:	Engine	eerin	g M	ech	nani	cs											
Refere	nces:																	
1.	Bhavikatti., S. S.	and Ra	jash	ekar	app	pa.,	K. (	J. '	"En	ginee	ering	g Mec	chanic	es", N	Jew	Age Iı	nternatio	nal
]	Publishers, 2015,	5 <sup>th</sup> Edit	tion.								_					. ~		
2.	Khurmi. R. S., "	Textbo	ok of	Ap	olie	ed N	Aecl	han	nics	", Та	ta N	AcGra	aw Hi	ll Pu	blish	ning C	ompany,	2013,
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	through experim	nents.																
CO2	Execute the exp	erimen	ts to	veri	fy	the	law	s of	f me	echai	nics	analy	tically	y	III		Applying	5
	and graphically.																	
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Course	e Contents:																	

## LIST OF EXPERIMENTS

- 1. To verify of law of triangle of forces.
- 2. To verify of law of polygon of forces.
- 3. Determine the support reactions for Simply Supported Beam.
- 4. To verify the principle of moments with the help of Bell crank lever apparatus.
- 5. Determine the coefficient of friction for motion on horizontal plane.
- 6. Determine the coefficient of friction for motion on inclined plane.
- 7. Determine efficiency of simple screw jack apparatus.
- 8. Determine efficiency of worm and worm wheel apparatus.
- 9. Graphical solution for concurrent and non-concurrent coplanar force system.
- 10. Graphical solution of statically determinate Beams.
- 11. Graphical solution of pin jointed perfect plane frames.

## Lab Assessment:

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE. IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
TA1	Lab activities,	Lab Course Feeulty	During Week 1 to Week 4	25
LAI	attendance, journal	Lab Course Faculty	Submission at the end of Week 5	23
1 4 2	Lab activities,	Lab Course Faculty	During Week 5 to Week 8	25
LAZ	attendance, journal	Lab Course Paculty	Submission at the end of Week 9	23
1 4 3	Lab activities,	Lab Course Feeulty	During Week 10 to Week 14	25
LAJ	attendance, journal	Lab Course Faculty	Submission at the end of Week 14	23
Lob ESE	Lab Performance and	Lab Course feaulty	During Week 15 to Week 18	25
LaU ESE	related documentation	Lab Course faculty	Submission at the end of Week 18	23

Week 1 indicates starting week of Semester.

Lab activities/Lab performance shall include performing experiments, mini-project,

presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

The experimental lab shall have typically 8-10 experiments.

Title of the Course: Workshop Practices LAB	L	Т	Р	Cr
Course code: 5ME152	0	0	02	01

#### **Pre-Requisite Courses:**

#### Textbooks:

1. Raghuwanshi B. S.,"A Course in Workshop Technology I", DhanapatRai Publications, 10<sup>th</sup> Ed.2009 2. S. K. Hajra Choudhury and A. K. HajraChoudhary, "Workshop Technology" – Vol I [Manufacturing Processes]", , Media Promoters and Publishers Pvt. Ltd., 10<sup>th</sup> edition, reprint 2001

#### **References:**

- 1. W.A.J. Chapman, "Workshop Technology Volume I", CBS Publishing & Distributors, Delhi. [ISBN-13:9788123904016] 2001
- 2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.
- 3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology I" Pearson Education, 2008

#### **Course Objectives :**

- 1. To train the students to use different tools and equipments involved in the manufacturing processes.
- 2. To develop the skills to handle the basic machine tools and equipments required for various manufacturing processes.
- 3. To prepare the students to carry out the various operations to make a finished product.
- 4. Train the students for making PCB for electronic applications.

со	After the completion of the course the student should be able t	Bloom	i's Cognitive
		Leve	Descriptor
CO1	Describe the methods, operations and processes of manufacturing	II	Understanding
CO2	Summarize the simple mechanical systems, machines, equipment's, the basic working of cutting tools for manufacturing.	II	Understanding
CO3	Use of chemical etching technique for making the PCB for electronic applications.	III	Applying

#### **CO-PO** Mapping : For Mechanical

		1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
(	CO1	F			L										* . <b>.</b> .
(	C <b>O2</b>	F			L										
	C <b>O3</b>	F				L									

#### Lab Assessments :

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE. IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
LAI	Lab activities, attendance, journal	Lab batch Faculty	During Week 1 to Week 4 Submission at the end of Week 5	25
LA2	Lab activities,	Lab batch Faculty	During Week 5 to Week 8	25

	attendance, journal		Submission at the end of Week 9	
LA3	Lab activities, attendance, journal	Lab batch Faculty	During Week 10 to Week 14 Submission at the end of Week 14	25
Lab ESE	Lab Performance and related documentation	Lab batch faculty	During Week 15 to Week 18 Submission at the end of Week 18	25

Week 1 indicates starting week of Semester after admission procedure and induction period.

Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

For workshop practice lab various lab activities are : Preparation of Job drawing, processing of the job in different sections of workshop, completing the process sheet and writing journal based on questions provided.

## **Course Contents:**

- 1. Composite job based on carpentry, fitting, tin-smithy, welding etc. (16 Hrs.)
- 2. Composite job of PCB making based on negative film making, UV exposure, development and etching etc. (6 Hrs.)

## Module wise Measurable Students Learning Outcomes : Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.
- By studying PCB making, students will able to make their own electronic circuits.

## **CO-PO Mapping for other departments:** Electronics

	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
CO1				L		L								
CO2	L			L										
CO3				L					L					

Electrical

	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
CO1				L	Ĺ			L						
CO2				L					L	L				
CO3				L						L				

	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
CO1				L				L						
CO2				L					L					
CO3				L							· · · ·			-

Civil

	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
CO1						L			L				1	
CO2						L			L				1	
CO3						L					L			

CSE

	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
C01				L				L						
CO2				L						_				·
CO3				L				L						

## Job Drawings [The detailed drawing of each section will be finalized after finalizing the proper dimensions of individual jobs and availability of respective job raw material]





All dimensions are in mm





Ti	Title of the Course: Programming for problem solving lab           Course code: 5CS151														т	D	Cr
U	ourse	coue.	303131										0		0	2	1
D	esirat	ole req	uiremen	ts: B	asic c	ourse	of soft	ware a	and har	dware	e prog	rammin	g.				
T	extbo	oks:											-				
	1. E	Byron (	Gottfried,	Schau	m's, "(	Outlin	ne of Pr	ogram	ming w	ith C	", Mc(	Graw-H	ill, Tl	hird e	dition	, 2017.	
	2. 1 3 F	rashav E Bala	ant Kanei	tkar, "I	Let Us gramn	s C″, ning i	BPB Pi n ANS]	iblicat	ion, Fif Sata Me	teent Graw	h editi z-Hill F	on, 201 Educatio	6. on Se	event	h editi	on 201	16
R	eferer	ices:	Barabanij	, 110	Brainin			,1	<u>utu 1110</u>	orum		Juuoun	, , ,		<u>ar curr</u>	011, 201	
	1.1	Brian V	<i>N</i> . Kernig	han ar	nd Der	nnis N	I. Ritch	ie, "T	he C Pr	ogran	nming	Langua	ige",	Pren	tice Ha	all of Ir	ndia,
C	011150	Second Objor	l Edition,	2015.													
• To impart problem-solving and programming skills to translate text described problems into																	
programs, written using the Programming language with the help of language constructs.																	
<ul> <li>To demonstrate use of computer language constructs and principles such as: conditional branching</li> </ul>														g			
		loops	, block st	ructure	es, fun	ction	s, and i	nput/o	utput fo	or im	pleme	nting pr	ograi	ms to	solve	proble	ems.
Course Learning Outcomes:																	
(	<b>CO</b>	After the completion of the course the student should be able toBloom's Cognitive															
			level Descripto														or
(	CO1	illus prog	rate the use of different Language constructs and principles of amming language using a programming environment/tool3Apply:												Applyi	ng	
(	CO2	impl	<b>Dement</b> programs using programming language in a programming 3 Applyin													ng	
	environment/using programming tool to solve problems																
<b>CO3</b> examine a given program to identify its output 3 Apply														Applyn	ng		
CO-PO Mapping :																	
			PO	-	5	e	4	S	9	~	×	6	10	11	12		
			10	PO	PO	PO	PO	PO	PO	$\mathbf{PO}$	PO	PO	PO	PO	PO		
		-	CO1				3	2									
			CO2				3	2									
			CO3				3	2	4								
Δ	seesen	nents	•				1: L	ow, 2: N	leaium, 3	: Hign							
L	ab As	sessm	ent:														
Tł	nere a	re four	compon	ents of	f lab a	issess	sment, I	LA1, 1	LA2, L	A3 a	nd La	b ESE.					
IN	1P: La	ab ESE	E is a sepa	arate h	nead o	f pas	sing.										
-	Asses	sment	La	Based	on		Co	nducte	d by	C	onduct	tion and	Marl	ks Su	bmissi	on l	Marks
	L	A1	La atten	dance.	iourna	al	Lab C	ourse	Faculty	Du Sul	ring w bmissi	on at the	o wee e end	ек 4 of W	eek 5		25
	T	٨2	La	b activ	vities,		LahC	ourse	Faculty	Du	ring W	veek 5 to	) Wee	ek 8			25
-	L	72	atten	dance,	journa	al	Lauc	ourse	racuity	Su	bmissi	$\frac{1}{2}$ on at the	e end	of W	eek 9		23
	L	A3	La	ib activ dance	iourn:	ə1	Lab C	ourse	Faculty	Du Sul	rıng W hmissi	eek 10 on at the	to Week 14 25				25
	Lab	ECE	Lab P	erform	ance a	nd	Laha	1011700	foorler	Du	ring W	veek 15	to Week 18				25
		сос 	related	l docur	nentat	ion	Lad	Jourse	raculty	Su	bmissi	on at the	e end	of W	eek 18		23
W	eek 1	indica	ites starti	ng we	ek of	Seme	ester.	anfam	ning or	nomin	nonto	mini -	roios	+	aconta	iona	

Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

## List of Experiments:

Assignments based on the following topics in line with topics covered in theory course:

- 1. Familiarization with programming environment IDE (Integrated development environment).
- 2. Writing algorithms to solve problems.
- 3. Variable types and type conversions
- 4. Programs to demonstrate different operators and their order precedence.
- 5. Programs to solve simple computational problems using arithmetic expressions e.g. simple and compound interest.
- 6. Programs to demonstrate problems on conditional branching e.g. roots of quadratic equation, finding a maximum/minimum value.
- 7. Programs to show statement block, conditional statement.
- 8. Programs to show different types of iteration / loop.
- 9. Implementation of iterative problems e.g., sum of series.
- 10. Programs to demonstrate matrix problems, string operations, sorting problems.
- 11. Programs to implement numerical methods problems (Root finding, numerical differentiation, and numerical integration): using array, function and recursion.
- 12. Programs to illustrate use of pointer with simple data type (create pointer variable, assign value, access value and show address using (\* and &).
- 13. Programs to solve the problems using pointers and structures e.g. swap two numbers.
- 14. File handling: Study and implementation file operations.
- 15. Programs to demonstrate simple read and write operation on the external text file.
- 16. Case study to demonstrate basic programming constructs.

Title of the Course: Engineering Physics Lab. 5PH151	L	Т	Р	Cr
Branch: All Branches	0	0	2	1

Pre-Requisite Courses: Students are expected to know the basic practical knowledge in HSC Level.

Textbooks: 1. C. L. Arora "Practical Physics" S. Chand & Co Edition 2009.

2. P.R. Sasi Kumar "Practical Physics", PHI Learning Pvt.Ltd 1st edition 2011.

#### References:

- 1. Halliday, Resnic and Walker, "Fundamentals of Physics", John Wiley, 9th edition 2011.
- 2. A. Beiser, "Concepts of Modern Physics", McGraw Hill International, 5th edition, 2003.
- 3. Ajoy Ghatak, "Optics", Tata McGraw Hill 5th edition, 2012.

#### **Course Objectives:**

- 1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- 2. To learn the usage of electrical and optical systems for various measurements.
- **3**. To Apply the analytical techniques and graphical analysis to the experimental data.

## **Course Learning Outcomes:**

CO	After the completion of the course the student should be able to	Bloom's Cognitive				
CO	After the completion of the course the student should be able to	level	Descriptor			
CO1	<b>Calculate</b> the diameter of the thin wire, wavelength of light, Planck's constant, values of e/m of an electron, Specific rotation of optical active substances. <b>Demonstrate</b> Hartley and Colpitt's oscillator with their simulations, Newton's ring, and I-V characteristics of semiconductor diode. Kundt's tube.	III	Applying			

## CO-PO Mapping : 3: High, 2: Moderate, 1: Low

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	1	1												

Assessments: : In Semester Evaluation (ISE)										
Assessment	Marks									
ISE-1	25									
ISE-2	25									
ISE-3	25									
ISE-4	25									

On the basis of each experiment performed during regular laboratory session, performance of experiment, quiz or oral, and final internal practical examination.

## **Course Contents:**

List of Experiments (Minimum 8 experiments from the following list)	2 Hrs. each	
1. Find the diameter of the thin wire by diffraction of the light	Expt.	
2. Determination of wavelength of light by plane diffraction grating.		
3. Determine the Specific rotation of sugar solution		
4. Find the wavelength of He-Ne Laser using Plane diffraction grating.		
5. Find the e/m for the cathode rays		
6. Verify the expression for the resolving power of a telescope.		
7. Measure the wavelength of ultrasonic waves by Kundt's tube method.		
8. Design and simulate Colpitt's & Hartley Oscillator.		
9. Determine the Planck's constant.		
10. Find the wavelength and velocity of ultrasonic waves in liquid.		
11. Study the I-V characteristic of semiconductor diode.		
12. Newton's ring: Determination of wavelength of light and refractive index of		
liquid.		

		-			1.0			7101		Ι		Т	Р		Cr
Title of the	Cour	se: Er	iviroi	imen	tal Sc	ience	(510	2101)		2	2	0	0		0
Textbooks:											I			1	
1. Mrii	nalini	Pande	, "Disa	aster N	lanage	emenť	', Wile	ey Pub	licatio	ons Nev	w Del	lhi, F	irst edit	tion.	2014
2. N.K 200:	Uber 5.	oi, "E	nviror	nmenta	al Stud	dies",	Excel	Book	s Pub	lication	ns Ne	ew E	elhi, fi	rst	edition,
3. R.R. editi	ajagop ion, 20	alan, 011	"Envii	ronme	ntal S	tudies	from	crisis	to cur	e" Oxf	ord u	nive	rsity pro	ess,	second
References	:														
1. Will Con	liam. ( cern",	Cunnii WCB	ngham /McG	and 1 raw H	Barbar ill pub	a Woo licatio	odwor on, 5th	th Saig Editio	go, "E on, 199	nviron 99.	ment	al Sc	cience:	A	Global
<ol> <li>Peter. H. Raven, Linda. R. Berg, George. B. Johnson, "Environment", McGraw Hill publication, 2nd -Edition, 1998.</li> </ol>															
<ol> <li>Catherine Allan &amp; George H. Stanley (Editors), "Adaptive Environmental Management", Springer Publications. 2009.</li> </ol>															
Course Ob	jectiv	es :													
1. Infuse an understanding of the various environmental concepts on scientific basis in the															
func	tional	area c	of Eng	ineerii	ng and	techn	ology.								
2. Prov	vide a	found	ation	to crit	ically	assess	s the a	pproa	ches t	o pollu	ition	cont	rol, env	viror	imental
and	resou	rce m	anage	ment,	sustan	inable	devel f the fi	opmei	it, cle	aner to	echno	010g1 tal di	es, Env	'iror	imental
3. Incu	lcate 1	the mo	odern	concei	ot of g	reen i	ndusti	v and	the in	npact (	of exc	car ul	human	ns. popi	ulation.
glob	alizati	on, an	d clim	ate ch	ange o	on the	enviro	nmen	t.					P°P'	<i></i> ,
Course Lea	arning	g Outc	omes:												
	After	the co	omplet	tion of	the co	ourse t	he stu	dent sl	nould	be	-	Bloo	m's Co	gnit	tive
CO	able	to	r								L	evel	D	escr	iptor
CO1	Desc	ribe k	ey cor	icepts	of En	vironn	nental	scienc	ce and	their		II	Und	lerst	anding
	relati	onship	to en	gineer	ing.	aanaih	:1:44	for	nainaa	mand					0
CO2	Expla his	nii eu role	in ef	fective	ai iesj	olemer	ntation		sustai	nable		п	Und	lerst	anding
002	activ	ities th	rough	EIA	and EN	MS in	the co	rporate	e secto	or.			Che	.0150	unung
	Predi	ct in	npact	of	conter	nporar	y iss	sues	(Popu	lation					
CO3	Explo the en	osion, nviron	Clima ment.	ate ch	ange,	Envir	onmer	ntal po	ollutio	n) on		II	Und	lerst	anding
CO-PO Ma	apping	g:(Us	e 1, 2,	3 as (	Corre	lation	Stren	gths)					<u> </u>		
РО	1	2	3	4	5	6	7	8	9	10	11	12	2 PSC	)1	PSO2
CO1						2	2								
CO2							3	2							
CO3 2 2															

## Assessments :

#### **Teacher Assessment:**

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:						
Module 1: Environment, Ecology and Biodiversity	Hrs.					
<ul> <li>Introduction: Natural and Built Environment, Environmental education: definition, scope, objectives and importance, Components of the Environment: Atmosphere, Hydrosphere, Lithosphere and Biosphere.</li> <li>Ecology : Introduction, Types (terrestrial and aquatic ecosystems), Structure and function, Trophic levels, Food chains, food webs, Ecological pyramids, Ecological succession, Biogeochemical cycles.</li> <li>Biological Diversity: Introduction, Value of biodiversity: consumptive use, Threats to biodiversity, Conservation of biodiversity.</li> </ul>	07					
Module 2: Human Population, Energy and Natural Resources	Hrs.					
Human Population Growth and Environment: Population Dynamics, Age structures, Energy Scenario: Future projections of Energy Demand, Utilization of various Energy Sources, Conventional Energy Sources and Non- Conventional Energy Sources, Urban problems related to energy. Natural Resources: Food, Water, Forest, Geological, Equitable Use of Resources for Sustainable life style. Case studies.						
Module 3: Climate Change, Environmental Quality and Pollution Control	Hrs.					
Climate change: Global warming, Ozone depletion, Acid Rain. Environmental Impact: Impact of Modern agriculture on the Environment, Impact of Mining on the Environment, Impact of Large dams on the Environment, Environmental pollution: Air, Water, Soil, Noise, Marine, classification of pollutants, their causes, effects and control measures. Case studies.	05					
Module 4: Solid, Hazardous Waste and Disaster Management	Hrs.					
Solid and Hazardous waste management: Introduction, categories, causes, effects and management of municipal solid waste, Hazardous waste Disaster Management: Introduction, types of disasters, Disaster mitigation. Case studies.	04					

Module 5: Social Issues, Environmental Management and Legislation	Hrs.
Environmental ethics: Introduction, Ethical responsibility, issues and possible solutions. Environmental Management: Introduction to Environmental Impact Assessment, Environmental Management System: ISO 14001Standard, Environmental Auditing, National and International Environmental protection Agencies pertaining to Environmental Protection. Environmental Legislation: Environmental protection act 1986, Water (prevention and control of pollution) Act 1974, Air (prevention and control of pollution) Act 1981, Wild life Protection Act 1972, and Forest Conservation Act 1980. Municipal Solid Wastes (Management and Handling) Rules, 2000.	04
Module 6: Cleaner technology	Hrs.
Restoration Ecology, Role of Information Technology in Environment science, Green buildings, Green products, Consumerism and Waste Products, Minimization of Hazardous Products, Reuse of Waste, By-products, Rainwater Harvesting, Translocation of trees. Some Success Stories. Case studies	03
Module wise Outcomes	
At end of each module students will be able to Module 1:	
Determine an in-depth understanding of the interdisciplinary relationship of cultural, ethical, and social aspects of local/global environmental issues. Understand how interactions between organisms and their environments drive the dynamics of individuals, populations, communities, and ecosystems.	
Describe the impact of human population on the environment, and the utilization of natural resources for sustainable life style.	
Explain the issues like Climate change, Global warming, Global Warming Potential, Ozone depletion, Ozone depletion Potential, Impact of Modern agriculture on the Environment, Impact of Mining on the Environment, Impact of Large dams on the Environment, Bio magnification, Eutrophication and apply learned information to postulated environmental scenarios to predict potential outcomes. Module 4:	
Identify and define different disasters and their mitigation in addition to solid and hazardous waste management.	
Module 5: Sense the legislation governing environmental research and the environment. Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems. Module 6:	
Describe strategies, technologies, and methods for assessment and sustainable management of environmental systems and for the remediation or restoration of degraded environments.	
<b>Tutorial:</b> The tutorials consist of Quiz, Tests, Assignments in addition to a mini project work based on diverse environmental issues and topics.	

Title of the Course: 5 CH 101: Engineering Chemistry															L		Т	Р	Cr
															03		0	0	03
Pre-Req	uisite Cours	ses: Cl	hem	nistr	y co	ours	e at	seco	nda	ry	and	highe	r seco	ndary	level				
Textbo 1. S.K. S 2. Shasi 3. Jain P	<b>Textbooks:</b> 1. S.K. Singh, "Engineering Chemistry", New Age Publication, 3 <sup>rd</sup> Edition, 2005. 2. Shasi Chawla, "Engineering Chemistry", Dhanpat Rai Publication, 3 <sup>rd</sup> Edition, 2003. 3. Jain P.C. and Jain Monika, "Engineering Chemistry", Dhanpat Rai Publication, 16 <sup>th</sup> Edition, 2013																		
Refere	nces:		,	0		0		,	,					,		,			
1. O G P	alanna, "En	gineerir	ng Cl	hem	istry	r" Ta	ta N	/lcGra	aw ł	Hill 2	2009								
2. J Mer	ndham, R.C.	Denney	/, J.C	). Ba	rnes	s, M.	J.K <sup>-</sup>	Thom	nas,	"Qu	anti	tative	Chemi	cal ana	lysis",	Vog	el's Pe	earson	
Educa	ation, 6th Ed	lition , 2	2008	3 <b>.</b> 	" -	~													
3. S.S Da	ara, "Engine	ering Cl	nem	istry	/" S.	Chai	nd a	ind C	omp	bany	/ 200	)8. 		Dublic	ation	م <sup>th</sup> ۲	dition	2002	
4. Askeignu and Phule, The Science and Engineering of Materials Thomson Publication 4° Edition, 2003																			
Course Objectives :																			
1. To make student familiar with engineering properties associated with different materials to use them successfully in practice																			
successfully in practice.																			
2. To provide knowledge on methods of characterization and chemical analysis.																			
CO         After the completion of the course the student should be able to         Bloom's Cognitive																			
	level Descriptor												r						
CO1	Explain ch	emical	anal	ysis,	, the	rma	lana	alysis	, wa	ter	cher	nistry,	phase	rule.	1	I	l	Understar	nding
	Types of polymers and its application and water's industrial applications.																		
	Draw sche	Draw schematic of water softeners, phase diagrams, Thermo grams,																	
	calorimete	er and fu	uel c	cells	set	ups.													
			I	1		1		1					1 ( .)		,	1			
02	and therm	pes of c ial analy	nen /sis.	าเcai	ana	iysis	, na	rd wa	ater	, ро	iyme	ers, tue	el, tuel	cells		1	ľ	Understar	nding
CO3	Calculate	concent	rati	on o	of sol	utio	ns, S	% or	GF	of ar	nalyt	e gravi	imetrio	cally,			ļ	Applying	
	hardness o	of water	r, Ca	lorif	ic va	lues	5												
	Manning · C		lanr	ning	• 2•	High	2.	Mod	ora	ho 1	•10	A/							
0	viapping . C		Iahł			ngn	, 2.	lviou							PSO	DS			
		РО	1	2	3	4	5	6	7	8	9	10	11	12	1	02			
		CO1	2																
		CO2	2																
		CO3	2																
Assessn	nents :																		
Teacher	Assessmen	nt:		_				-  -			_						_		
Two cor	nponents of	t In Sem	este	er Ev	/alua	tion	(ISE	=) <i>,</i> Or	ne N	1id S	Seme	ester E	xamina	ation (N	vise) a	nd o	ne En	d Semest	er
Examina	ation (ESE) r	aving 2	0%,	30%	and	1 50%	% W	eight	s re	spe		iy.							
	ment									1		5							
										1	0								
										3	0								
										5	0								
	nd ISE 2 are	haced	ากจ	ccim	nmo	nt/d	مداء	ared t	Dct.	د _ سە/	7/60	minar	etc						
	ssessment	is haced	Jii d I on	50%	Sofe	nyu		n eu l ontoi	nt (N	Jorn	∠/ sei nallu	firct +	hree m	مطيناهم	:)				
FSF A	ssessment i	s hased	on	100%	, 01 ( % ro	urse		ntent	wit	•011 h 70	1.209 )-809	weig	htage	for cou	'' rse co	nten	t (nor	mally last	
three r	nodules) co	vered a	fter	MSI	F.	0130	01	iterit	VVIC		, 00,	o weig	mage			men		many last	•
		.c.cu d		14131	-•														

Course Contents:						
<b>Module 1. General principles of chemical Analysis</b> - Chemical analysis, Its types, Advantages and Disadvantages of instrumental and non-instrumental methods, Different ways to express concentration of solution. Numerical problems. Standards and its types. Titrimetric analysis, Definition of terms associated with titrimetry. Classification of titrimetry, Gravimetry and its requirements, applications.	08Hrs					
<b>Module 2 Water Chemistry</b> - Natural sources of water, Impurities in natural water. Water quality parameters Hardness- Definition, Causes, Types, Expressing hardness, units to measure hardness, Numerical problems on hardness calculation, ill effects of hard water in steam generation, Ion exchange method of water softening, Dissolved oxygen(DO), Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) its significance.	5Hrs.					
<b>Module 3- Phase Rule:</b> Gibbs phase rule, Explanation of the terms Phase, Component, Degree of freedom, Phase reactions, types of equilibrium, equilibrium conditions. One component system- Water system, Sulphur system, Two component system- Lead Silver system, Application of Eutectic system, Merit and Demerits of Phase rule.	6Hrs.					
<b>Module 4 Polymers</b> - Polymer, Polymerization reactions – Addition, Condensation and Co polymerization. Comparison of addition and condensation polymerization and polymers, Plastics and its types- Thermoplastic and thermosetting plastics, comparison Thermoplastic and thermosetting plastics, Properties and Uses of Poly Vinyl Chloride (PVC), Bakelite, Epoxy resin, Fiber Reinforced Plastic (FRP), Rubber and properties of Rubber, vulcanization of natural rubber.	7Hrs.					
<b>Module 5</b> Thermal Analysis – Thermal analysis and its types, Thermal events, Thermal analysis methods Thermo gravimetric Analysis (TGA), Differential Thermal Analysis (DTA)and Differentia Scanning Calorimetry (DSC) w.r.t. Principle, instrumentation, and applications, Interpretation of Thermogram	6Hrs.					
<b>Module 6.Energy Science</b> : Fuel and its classification, Characteristics of good fuel, Properties of solid, liquid and gaseous fuels. Calorific value, Gross and net calorific value, its units, and determination by bomb and Boys calorimeter, Numerical problems on calorific value. Fuel cell, its types and applications.	6Hrs.					
<ul> <li>Module wise Measurable Students Learning Outcomes :</li> <li>After the completion of the course the student should be able to:</li> <li>1: Explain and select chemical method of analysis.</li> <li>2: Decide suitability of available water towards various industrial applications.</li> <li>3: Describe one and two component systems and terms associated with respect to heterogeneous system</li> <li>4: Describe properties and uses of different organic materials plastics i.e. PVC, Bakelite, Epoxy, FRP</li> <li>5: Select proper thermal method to analyse properties of material.</li> <li>6: Describe and determine calorific value by different methods. Solve calorific value calculation problems</li> </ul>						
Tutorial: Nil						

Title of	f the Cour	se: Er	gineer	ing M	athema	tics –I	I			Ι		Т	Р	Cr
Course	e Code: 5	MA-10	2		3	•	1	-	4					
Pre-Re	equisite Co	ourses:												
Textbo	nks.													
1	"A Text	Book o	of Appl	ied Ma	athemat	ics Vo	l I and	II" P	N ar	nd J N	Wart	ikar	Vidvar	hi Griha
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2	"Higher F	nginee	ring Ma	aths" I	B S Gr	ewal F	Channa	Public	ation	2005 39	9th Ea	dition	n	
<u>-</u> . 3.	Fundamer	ntals of	Mathe	matical	Statist	ics and	probal	bility S.	C. Gu	pta 2014	.Sul	tan cl	hand &S	Sons
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Refere	ences:											1.5		10-00
1.	"Advance	d Engu	neering	, Mathe	ematics	", Erwi	n Krey	yszig, W	lley l	Eastern	Limit	ed Pi	ublicatio	on, 1978,
	1st Edition	n.								a				
2.	"Advanced Engineering Mathematics", Wylie C.R., Tata McGraw Hill Publication, 1999, 8th													
2	Edition.	г ·			, · · ·,	TT TZ			100		T / 1	1000	5 18t m 1	• , •
<i>3</i> .	Advanced	Engine	ering I	Mathen	natics <sup>~</sup> ,	H. K.	Dass, S	S. Chan		ompany	Ltd.,	1988	$S, I^{s} Ed$	1t10n.
41	Engineerin	g Math	ematic.	s (Volu	(me-1) <sup>°°</sup> ,	S. S. S	Sastry,	Prentice	e Hall	Publicat	10n, 2	2006,	3rd Ed	ition.
Course	e Objectiv	es:		1 .1.11		hanaa	41 1	~ ~ ~ ~ ~ ~ ~ ~	n of of					
1.	To develo	p main			s and en		uninkii	ig powe	r of st	udents.	:			1.1.
	2. To introduce fundamental concepts of mathematics and their applications in engineering fields.													
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CO2	Use math	ematica	al and co	omputa	tional m	lethods	to solv	e the		111	Ар	plyin	g	
	problems	in scier	ice and	engine	ering fie	ld.								_
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ISE 1

MSE

ISE 2 ESE

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three

modules) covered after MSE.

## **Course Contents:**

Module 1: Beta-Gamma Functions:	5Hrs.
Definition of Beta, Gamma functions and properties of Beta Gamma functions.	
<b>Module 2: Multivariable Calculus:</b> Multiple Integrals: Double integrals, change of order of integration, change of variables (Cartesian to polar) Evaluation of triple integrals, Application of Multiple integrals such as Area enclosed by plane curves, Mass of lamina, Volume of solid.	10Hrs.
Module 3: Numerical Solution of Ordinary Differential Equations of first order	6Hrs.
and first degree:	
Numerical Solution by (i) Picard's Method (ii) Taylor's series method (iii) Euler's method (iv) Modified Euler's method (v) Runge-Kutta fourth order method.	
Module 4: Probability theory:	6 Hrs.
Introduction, Sample Space, Events, Axioms of probability, Conditional probability	
Baye's Theorem	
Module 5: Statistics:	6 Hrs.
Correlation, Regression, Curve-fitting.	
Module 6: Probability Distribution:	7Hrs.
Random Variable, Binomial distribution, Poisson distribution, Normal distribution.	

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2. Dra	aw proj	ections	of	geo	me	tric	al o	bjec	ets a	ind r	real	life	com	ipon	ents.			~ .			
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A8	Sessmen ISE 1	ι										Marks		
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	ESE											50		
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MSE: Assessment is based on 50% of course content (Normally first three modules)														
ESE: Assessment is base	ed on 10	0% (	cou	rse c	onte	ent w	ith 6	0-70 <sup>°</sup> %	weig	ghtage	for cou	urse co	ntent (normall	v last three
modules) covered after N	ASE.								-				<b>`</b>	
<b>Course Contents:</b>														
Module 1: Introductio	on to En	igin	eer	ing	Dra	win	g					-		4 Hrs.
Deinsieles of Engineering Orabies of the initial of the second se														
Principles of Engineering Graphics and their significance, usage of Drawing instruments,														
lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid,														
Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;														
Problems from the above units should also be practiced on computer aided drafting software.														
Module 2: Orthographic Projections														5 Hrs.
Module 2: Orthographic Projections														
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined														
to both planes; Projecti	ons of p	olan	es i	ncli	ned	Plar	nes -	Auxil	iary	Plane	s;			
Problems from the abo	ve units	sho	ould	l als	o be	pra	ctice	ed on c	omp	uter a	uided d	rafting	g software.	
Module 3: Projection	s of Reg	gula	r S	olid	s S	ecti	ons	and Se	ctio	nal V	ïews oj	f Righ	t Angular	4 Hrs.
Solids														
Inclined to both the Plan	nes- Au	xilia	ary	Vie	ws; 🤅	Drav	w sii	nple a	nnota	ation,	dimen	sionin	g and scale.	
Floor plans that include	e: windo	ows,	do	ors,	and	fixt	ures	such	as W	'C, ba	th, sin	k, shov	wer, etc.	
Prism, Cylinder, Pyram	iid, Con	e – .	Au	xilia	ıry V	liew	s; D	evelop	men	t of s	urfaces	s of Ri	ght Regular	
Solids - Prism, Pyran	nid, Cy	lind	er	and	Co	ne;	Dra	w the	sect	ional	ortho	graphi	c views of	
geometrical solids, obje	ects from	n in	dus	stry	and	dwe	lling	gs (fou	ndat	ion to	slab o	only)		
Problems from the above	ve units	sho	uld	als	o be	pra	ctice	ed on c	omp	uter a	ided d	rafting	, software.	
Module 4: Isometric I	Projecti	ons												4 Hrs.
Principles of Isometric	projecti	on -	– Is	ome	etric	Sca	le, I	somet	ic V	iews,	Conve	ention	s; Isometric	
Views of lines, Planes	s, Simp	le a	nd	cor	npo	und	Sol	ids; C	onve	rsion	of Isc	ometri	c Views to	
Orthographic Views an	d Vice-	vers	a, (	Con	vent	ions	;							
Problems from the above	ve units	sho	uld	als	<u>o be</u>	pra	ctice	d on c	omp	uter a	ided d	rafting	, software.	
Module 5: Introduction	on to Ca	mp	ute	r Ai	ded	Ske	tchi	ng						5 Hrs.
Introduction, Drawing	Instrum	ents	s an	d th	ieir	uses	, BI	S conv	enti	ons, I	Letterii	ng, Di	mensioning	
and free hand practicing	g. Comp	uter	r sci	reen	ı, lay	out	oft	he soft	ware	, stan	dard to	ool bar	/menus and	

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	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.	
	Module 6: Annotations, layering & other functions	4 Hrs.
	Applying dimensions to objects, applying annotations to drawings; Setting up and use of	
ł	Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths	
	through modifying existing lines (extend/lengthen); Printing documents to paper using the print	
	command; orthographic projection techniques; Drawing sectional views of composite right	
	regular geometric solids and project the true shape of the sectioned surface; Drawing	
	annotation, Computer-aided design (CAD) software modeling of parts and assemblies.	E
	Parametric and non-parametric solid, surface, and wireframe models. Part editing and two	
	dimensional documentation of models. Planar projection theory, including sketching of	
	perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises.	į.
	Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of	
	dwelling;	
1	Module wise Measurable Students Learning Outcomes :	
1	After the completion of the course the student should be able to:	
	I he student will learn :	
	Introduction to engineering drawing and its place in society	
	• Exposure to the visual aspects of engineering design	
	<ul> <li>Exposure to engineering graphics projection of standard solid primitives</li> </ul>	
	<ul> <li>Exposure to visualization of 3-D solid modeling</li> </ul>	
	<ul> <li>Exposure to computer-aided geometric drafting</li> </ul>	
	<ul> <li>Exposure to creating working drawings</li> </ul>	
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ſ	Title of	' th	the Course: Basic Electrical Engineering 5EL 101												Т	Р	Cr
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	3.	B.I	L The	raja "A	A Text	book o	of Elec	trical T	echno	logy",	S Cha	nd Publ	ication.	201	3.	10.	
F	Referer	nce	es:	5						0, ,			,				
	1.	V.	D. To	oro, "E	lectrica	al Engi	ineerin	g Func	lament	als", P	rentice	Hall In	dia, 198	89.			
	2.	E.	Hugh	es, "El	ectrica	l and H	Electro	nics T	echnol	ogy", F	Pearsor	n, 2010.	,				
	3.	V.	N. M	ittle an	d Arvi	nd Mi	ttal, "E	Basic E	lectric	al Engi	ineerin	$g'', 2^{nd}$	edition	TM	H, 200	)6.	
(	Course	ourse Objectives :															
	1. '	1. This course intends to summarize and solve electrical and magnetic of															
	2. It imparts skill to identifying principles, construction and												electri	cal r	nachir	nes.	
	3. 1	It c	levelo	ps skil	ll to de	scribe	the wi	ring sy	vstem, I	lamps a	and lov	v voltag	e instal	latio	on com	poner	nts.
(	Course	L	earnii	ng Out	tcomes	5:											
	CO	CO After the completion of the course the student will be able to													m's C	ogniti	ve
	After the completion of the course the student will be able to													el	D	escrip	tor
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	CO2		Solve	electri	ical an	d magr	netic ci	ircuits.					3		A	pplyi	ng
(	CO-PO	) N	lappi	ng :													
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					MSE								30				
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	ISE 1 a	ınd	ISE 2	are bas	sed on a	assignn	nent, or	al, sem	inar, te	st (surp	rise/dec	clared/qu	iz), and	grou	ıp disc	ussion	.[One
	assessn	nen	nt tool	per ISE	E. The a	issessm	ent too	l used f	for ISE	1 shall	not be	used for	ISE 2]				
	MSE: A	Ass	sessme	ent is ba	used on	50% of	f course	e conte	nt (Nor	mally fi	rst thre	e module	es)		,		
	ESE: A	Ass	essme	nt is ba	ised on	100% (	course	content	with/(	J-80% v	veighta	ge for co	ourse con	ntent	(norm	ally la	st three
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	Module 2: AC Circuits	
	Representation of sinusoidal waveforms, peak, RMS values, phasor representation real, reactive and apparent power. Analysis of single-phase, ac circuits consisting of R, L, C, RL, RC, RLC (series and parallel) circuits and three-phase balanced circuits. Voltage and current relations in star and delta.	7
	Module 3: DC Machines	Hrs.
	Construction, working principle and types of DC generator and Motor. Voltage and speed control methods, Speed-Torque characteristics. Principle, construction, working and application of stepper, servo and universal motors.	6
	Module 4: Transformers	Hrs.
	Magnetic circuits, Construction, working principle and types of single-phase transformer, open circuit and short circuit tests: Losses, efficiency, all-day efficiency and regulation. Autotransformer.	6
	Module 5: AC Machines	Hrs.
	Construction and working principle of single and three- phase induction motor. Types,	
	torque- speed characteristics and applications of induction motor, Types of starters, AC generator.	6
	Module 6: Wiring, Electrical Installations and Components of LT Switchgear	Hrs.
	Switch fuse unit, MCB, ELCB, MCCB. Types of wire and cables. Staircase, Go-down and Domestic wiring, CFL, LED, Fluorescent tube. Lighting schemes, Earthing, types of batteries, characteristics of batteries.	4
N	Aodule wise Measurable Students Learning Outcomes:	
ŀ	After completion of the course students will be able to:	
	1. Explain the KVL and KCL to solve electric and magnetic circuit.	
	2. Explain fundamentals of AC circuit.	
	3. Describe construction and working of DC machine.	
	4. Summarize construction and working of single- phase transformer.	
	5. Describe three- phase and single- phase Induction Motor with application.	
	6. Recognize wiring, illumination, supply system and installation components.	

Title of	the Co	urse:	Ardı	uino	Bas	ed S	Syste	ms	5EN	J101					L	Т	Р	Cr
	of the Course: Arduino Based Systems 5EN101         Requisite Courses: : No pre-requisite course.         tbooks:         . "Arduino Cookbook", Michael Margolis, O'Reilly Publication rences:         . "Beginning Arduino", Michal Mc Roberts, Second Edition, Appenders, Second Editon, Second Editon, Second Editon Second Editor, Appenders, Second Editor, Second Editor, Appenders, Second Editor, Appenders, Second Editor, Second Editor, Second Editor, Second Editor, Appenders, Second Editor, Sec			2	0	0	2											
Pre-Re	quisite	Cours	es:	: No	pre-	-req	uisite	e cou	rse.									
Textb	ooks:	C	1 1	1 22	ъ <i>т</i> .			1.	~	ים יוו		1 1.	<i>.</i> .	202	0			
l. Defense	Arduir	10 C00	Kboo	ΟΚ΄,	M1C	hael	Mar	golis	$s, 0^{r}$	Reill	ly Pu	blica	tions	5, 202	0			
	ices: "Regint	ning A	rduir	۰ <u>،</u> ۲	Mick	nal N	Ac R	oher	te S	econ	d Ed	ition	Δnr	ess P	ublichin	σ 2013		
1. 2	"Cottin	a stort	nd wi	10 , 1 ith A	rdui	na"		aaim	6, D	nzi	$2^{nd}$		, Api	2005 I 1270 - 11	$1_{\rm M}$ 2011	19,2013		
	Object	g starte		iui A	Iuui	110 ,	, ivia	88111	0 D2	ullZI,	2		JII, C	) Kell	Iy, 2011	L		
The ob	iectives	of the	COIII	rse a	re:													
•	To expl	ain and	d illu	istrat	e the	e fur	ndam	enta	ls of	digit	tal sy	stem	is and	d op-a	amps wl	nich are i	necessar	v for
	Arduino based simple systems.													F	<b>r</b>			<i>,</i>
• ′	• To explain, demonstrate the Arduino progr											iguag	ge an	d IDE	E			
• '	To illus	trate a	nd de	emor	istra	te pi	rogra	ming	g for	basi	c Ar	duine	o syst	tems.				
• ′	To illustrate how to build the prototype circuits and connect ther												m to t	he Ardu	uino for	building	useful	
:	systems	5.																
Course	Loom		4000															
Course	Learn	ing Ou	IICOI	nes:												Rloom's (	Cognitive	<b>a</b>
CO	After	After the completion of the course the student shou											le to		I	evel	Descri	ntor
C01	Explai	n funda	ment	tals o	f dig	ital s	syster	ns an	nd on	eratic	nal a	mpli	fiers				Expl	ain
	Illustra	te the	func	dame	ntals	of	Ardu	ino.	inst	allatio	on o	f Ar	duino	IDE			Expi	um
CO2	Runnir	ng the	ardu	ino	execi	utabl	le fil	e, U	sing	IDE	to 1	orepa	re A	rduinc	, )	II	Descr	ribe
	sketch	0						,	0			I						
602	Writin	g progr	ams	for in	nterfa	cing	g vari	ous s	enso	rs an	d out	put d	evice	s with	1	111	D	-4
003	Arduir	10														111	Demon	strate
CO4	Illustra	te use o	of Ar	duin	o for	an a	applic	catior	n or a	a syste	em					III	Use	e
										•								
CO-PO	) Mapp	ing :																
	Г	PO	1	2	3	4	5	6	7	8	0	10	11	12	PSO1	PSO2	1	
		C01	3		5	-	5	U		0		10	11	12	1501	1502	-	
		CO2		3													-	
		CO3			2													
		CO4		2														
Assessm	nents •																	
Teache	r Asses	sment	:															
Two co	mponer	nts of I	n Sei	mest	er Ev	valu	ation	(ISI	E), C	)ne N	Aid S	eme	ster I	Exami	ination	(MSE) a	nd one E	Ind
Semeste	er Exan	nination	n (ES	SE) ł	navin	ng 20	0%,3	30%	and	50%	weig	ghts 1	respe	ctivel	y.			
	Assessment														Marks			
	ISE 1														$\frac{10}{20}$			
				$\frac{SE}{F2}$											<u> </u>			
			E	SE											50			
ISE 1 a	and ISE 2	2 are ba	used o	on as	signr	nent	/decla	ared t	test/q	uiz/s	emin	ar/ora	als etc	с.				
MSE: A	Assessm	ent is b	ased	on 5	0% o	f co	urse c	conte	nt (N	lorma	lly fi	rst th	ree m	odule	s)			
ESE: A	Assessm	ent is b	ased	on $10$	00% SE	cour	se co	ntent	t with	1 70-8	30%	weigh	ntage	for co	urse con	tent (nor	mally last	Į.
three m	nodules)	covere	d afte	er MS	SE.	cour	50 00	1100110		1,00	5070		ituge	101 00			inuity fust	

Course Contents:	
Module 1 : Overview of Digital Systems	Hrs.
Combinational Circuits- Adder, Subtractor, Multiplexer, Demultiplexer / Decoder, Sequential Circuits- Flip flops: S-R, D, Clocked flipflop, J-K Flip flop, Counters: Synchronous and Asynchronous, MOD –N Counters, Shift Registers, Memory Block	5
Module 2 : Operational amplifiers	Hrs.
Block Diagram, Basic Operations, Op-Amps as comparator, Op amp in feedback mode, Inverting/ Non- inverting Amplifier Adder/ Subtractor	5
Module 3 :Introduction to Arduino	Hrs
Arduino device, Types of arduino, Features of Arduino, Components of Arduino board, Description of Microcontrollers, Installation of Arduino, Run the arduino executable file, Using IDE to prepare Arduino sketch, Uploading and running the sketch, Program notation: variables, functions, control flow, Arduino conventions. The concept of a program variable. Numerical values and basic numerical operators. if/then/else iteration using for loops. Real world timing and the delay() function	5
Module 4 : Input/Output Programming	Hrs.
Sensor Inputs:- Definition, Types. Interfacing arduino to different sensors- light sensor, temperature sensor, sound sensor, distance ranging sensor, water/detector sensor, smoke, gas, alcohol sensor, ultrasonic sensor Displays: Basics of LED's and LCD's. Interfacing arduino to LED's- blinking single LED, blinking multiple LED's, 7 segment display, LED dot matrix. Interfacing to LCD's- 16x2 LCD display	4
Module 5 : Input/Ouput Programming	Hrs.
Motor control: DC motors- Speed control, spin direction control. Servo motor control, Steppers and Robots, Communication over Ethernet: Ethernet shield, internet weather, display, e-mail alert system, Arduino Libraries Using ESP 8266 – Logging data on online server using ThingSpeak	4
Module 6 : Arduino Applications	Hrs.
Case studies : Arduino based robot car, Arduino based PLC industrial application	3
<ul> <li>Module wise Measurable Students Learning Outcomes : Students will be able to</li> <li>1. Explain the basic concepts of digital systems.</li> <li>2. Explain the basic concepts of operational amplifier</li> <li>3. Illustrate the basics of Arduino and</li> <li>4. Illustrate the programming of Arduino for various sensors</li> <li>5. Illustrate the programming of Arduino for motor/display control</li> <li>6. Explain and illustrate case studies of systems using Arduino</li> </ul>	

Title o	f the C	ourse:	E 151	Engi	nee	rin	g G	raj	phi	cs a	and	J A	uto	CA	D L	ab		L	,	T	P 2	Cr
Pre-R	eanisit	e Cours	ses:	Ba	sic	Kn	ow	leda	Je (	of (	Con	nnu	iter									
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1. Bh 2. Sha 3. Ag	att N.D ah, M.E rawal I	)., Pancl 3. and R 3. and A	hal Rana Agra	V.M a B.Q awal	1. ai C., I C.	nd Eng M	Ingl gine ., Ei	le P erin ngir	.R. ng l	, Eı Dra ring	ngii iwii g G	neei ng a irap	ring and hic	g Di Co s, T	awi mpu MH	ng, Cł ter Gr Publi	narota aphie catio	ar Pul cs, Pe n, 20	olisl arso 12.	ning Ho on Educ	use, 201 ation, 20	4. 00 <b>8</b> .
Refere	nces:		-	-							-	-										<u> </u>
<ol> <li>Narayana, K.L. and P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008.</li> <li>Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2010</li> <li>Fredderock E. Giesecke, Alva Mitchell others, Principles of Engineering Graphics, Maxwell McMil Publishing, 2010.</li> </ol> Course Objectives :														2010 Millan								
Course	e Obje	ctives :																				
1.	To im	part the	tec	hnic	ques	5 01	en	gine	eeri	ing	gra	aphi	ics I	usin	ig th	e CAI	) sof	tware	•			
2.	To pre	pare the	e st	ude	nts	for	app	olyi	ng	kno	owl	ledg	ge o	of er	ıgin	eering	grap	hics	in r	eal life	lrawing	s using
	CAD s	software	e																			
3.	To dev	elop th	e sl	kills	of	stu	den	ts fo	or e	eval	luat	ting	; CA	٩D	soft	ware f	or its	appl	icat	ions.		
Course	e Lear	ning Ou	utco	ome	s:											<u> </u>						
СО	After the completion of the course the student should be able										ole to	BI	oom':	s Co	gnitive							
														Le	vel	D	escripto	r				
CO1	Understand the basic principle of Engineering graphics an working of CAD software.											cs and	1	11	U	Indersat	nding					
CO2	Draw	differe	ent v	view	s o	fcc	mp	one	ent	usi	ng	the	CA	D s	oftv	vare.		III	A	pplying		
СОЗ	Apply	y the l	kno	wled	dge	of	f er	ngin	neer	ring	g g	grap	hic	s ir	ı re	al life		Ш	A	pplying		
	appli	, cations.			Ŭ			Ū														
CO-PO	) Map	ping :															1					
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		CO1	Н			<u> </u>	N	М						L			_	M			4	
		<b>CO2</b>			M		Ļ	<u> </u>	_				-	-		_			_		-	
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Electri	P							3	4		5	6	7	8	9	10	11	12				
	CO1 M L L											L										
			F	CO	2			L														
			Γ	CO	3				1		M					L						

#### **Electronics Engineering Department**

s Depa	Department													
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CO1	L				L					Μ		L		
ĊO2			L											
CO3					M					L				

#### **Computer Science and Engineering Department**

Engineering Department														
PO	1	2	3	4	5	6	7	8	9	10	11	12		
<b>CO1</b>					Η					L		L		
CO2			L											
CO3					Η					L				

## **Information Technology Department**

PO	1	2	3	4	5	6	7	8	9	10	11	12
<b>CO1</b>					H					L		L
CO2			L									
<b>CO3</b>					H					L		

## Lab Assessment:

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE. IMP: Lab ESE is a separate head of passing.

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
I A 1	CAD Sheet Submission	Lab Course Faculty	During Week 1 to Week 4	25
LAI	and Attendance	Lab Course Faculty	Submission at the end of Week 5	23
T A D	CAD Sheet Submission	Lab Course Faculty	During Week 5 to Week 8	25
LAZ	and Attendance	Lab Course Faculty	Submission at the end of Week 9	23
1.4.2	CAD Sheet Submission	Lob Course Feaulty	During Week 10 to Week 14	25
LAS	and Attendance	Lab Course Faculty	Submission at the end of Week 14	23
	Lab Test Performance	Lah Course feaulty	During Week 15 to Week 18	25
Lao ESE	and Oral Presentation	Lao Course faculty	Submission at the end of Week 18	23

Week 1 indicates starting week of Semester.

Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Course Contents:	4 Hours
Submission of A3 size print of CAD drawing on following topics	for Each
1: Plane Curves and Conic Sections (Min. 5 Problems)	sheet
2: Projections of Points and Lines (Min. 5 Problems)	
3: Projections of Planes and Solids (Min. 6 Problems)	
4: Development of Lateral Surfaces (Min. 3 Problems)	
5: Orthographic Projections (Min. 2 Problems)	
6: Isometric Projections (Min. 2 Problems)	

Title	e of t	he Cou	urse: I	Basic E	Clectrio	cal En	gineer	ing La	b 5EL	151			L	Т	P	,	Cr
_			~										0	0	2		1
Pre-	Req	uisite (	Course	es:													
Text	tbool	ks:															
]	l. D	.C. Ku	lshresł	ntha, "I	Basic I	Electric	al Eng	ineerii	1g", 1 <sup>st</sup>	revise	d editio	nMcC	Graw 1	Hill,	, 2012.		
2	2. D	.P Kot	hari an	ld I.J N	lagrath	, " <i>Bas</i>	ic Elec	trical I	Engine	ering"	,Tata M	lcGra	w Hill	l, 20	010.		
Refe	<b>References:</b> 1. V. N. Mittle and Arvind Mittel " <i>Pagio Electrical Engineering</i> " 2 <sup>nd</sup> edition. Teta McCrew Hill																
0	1. V. N. Mittle and Arvind Mittal, " <i>Basic Electrical Engineering</i> ", 2 <sup>nd</sup> edition, Tata McGraw Hill.																
Cou	rse (	Jbjecti	ives :	anda ti	damaa		hadia	1		f Elect							
	l. I. ) T+	intond	irse int	lends to		nstrate	e Dasic	KNOWI	eage o	i Elect	rical eng	gineer	ring.	J +++	nos of	مامد	ntrian1
4	2. It intends to develop skills to recognize working principle, construction and types of electrical machines																
Соц	rse I	earni	<u></u> ոց Ուլ	trome	2•												
		After f	he con	npletic	<u>,</u> n of tl	he com	rse the	stude	nt wil	l be al	ole to		Bloo	n's	Cognit	ive	
	-			- <b>P</b> -									level		Desc	ripto	or
CC	01	Descril	<b>be</b> basi	ic conc	epts of	felectr	ical cir	cuits a	nd var	ious th	eorems.		2	1	Unders	tand	ing
CO2Demonstrate the use of transformers and AC/DC machines.3Applying																	
CO-	PO	Mappi	ng :												11	<u> </u>	
			C														
	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02												02				
	$\frac{01}{02}$	3								2							
	02	3								2							
Δεε	eem	ent•															
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			-	ISE 1								25					
				MSE	1							25	i				
				ISE 2	2							25	í				
				ESE								25					
ISE	21 an	d ISE 2	are ba	sed on a	assignn	nent, or	al, sem	inar, te	st (surp	rise/dec	clared/qu	iiz), ai	nd groi	up d	iscussio	n.[O	ne
asso MS	ESSING	ent tooi	per 151	2. The a	50% o	f course	I used I	OF ISE	T Shall mally fi	not be	used for	$15E_2$	]				
ESI	E. A. E: As	ssessme	ent is ba	ased on	100%	course	content	with70	)-80% v	veighta	ge for co	ourse o	conten	t (no	rmally ]	ast f	hree
mo	dules	) covere	ed after	MSE.					,		0			- (			
Cou	rse (	Conten	ts:														
1.	То	study A	AC and	l DC n	nachine	es parts	s and th	neir fui	nctions	•							
2.	То	study s	eries-p	parallel	RL, R	C and	RLC c	circuits									
3.	То	verify	KVL a	ind KC	L theo	rems.											
4.	Stu	idy of A	AC/DC	C moto	r starte	ers.											
5.	То	study s	peed c	ontrol	techni	ques o	t ac an	d dc m	achine	s.							
6. 7	To	perform	n load	test on	transf	ormer.			4								
/. o	10 Stor	study s	ervo n	10tor/ s	steeper	motor	with a		tion.	CCD							
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Title of	the Course:	Eng	gine	ering	Chen	nistry	y La	b 5	CH1	51			L	Т	Р	Cr	
													0	0	2	1	
Pre-Re	quisite Cours	ses:	Ch	emist	ry co	urse	at s	econ	Idary	and hig	gher se	econd	ary level				
Referen 1. Engin 2. J Men Pearson	nces: neering Chemi ndham, R.C. I n Education, 20	istry Denr 008.	y La ney, 6 <sup>th</sup>	borat J.D. Editi	ory M Barne on.	anual s, M.	, De J.K	part Thoi	ment ( nas, "	of Chem Quantita	istry W tive Cl	VCE, S hemic	Sangli. al analysi	s", Vo	ogels,		
Course	e Objectives	:															
1. To n	nake the stud	ent	fan	niliar	with	analy	ytica	ul teo	chnig	ues.							
2. To p	orovide hands	son	pra	octice	of tit	rime	tric	anal	vsis.								
· · · r			I .						5								
Course	Learning Ou	itcoi	mes	5:													
CO	After the co	omp	leti	on of	the co	ourse	the	stuc	dent s	hould b	e able	to	Bloom's	Cogni	itive		
													level	Desc	riptor		
CO1	Apply prine	ciple	es o	of Vo	olumet	ry to	qu	antit	ative	analysis	of w	ater	III	App	lying		
	quality para	mete	er, 1	netal	and a	lloys.	Dei	mon	strate	e use of i	instrun	nent					
	for quant	itati	ve	ana	alysis.	E	xper	ime	nt	physical	/Chem	ical					
	characteristi	cs o	f m	ateria	l.												
CO-PO	<b>O Mapping :</b>	3: ]	Hig	gh, 2:	: Mod	erat	e, 1	: Lo	W								
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		Л	I	I													
Assessn	nents : In Sen	neste	er E	valua	tion ()	(SE)											
		As	ses	smen	t								Mark	S			
			ISE	-1									25				
			ISF	-2									25				
													25				
			125	-3									25				
			ISE	-4									25				
On the	e basis of each	n exp	beri	ment	perfo	rmed	dur	ing r	egula	r laborat	ory se	ssion,	quiz, Ora	l and F	Final pe	erformar	nce
of exp	eriment.																
Course	Contents:																
	Contentest																7
Li	ist of experim	ents	s (a	ny 9)												2 Hrs	
1.	Estimation of	of ha	ardn	less o	f wate	r by I	EDT	A m	ethod	(Compl	exome	tric Ti	tration).			each	
2.	Estimation of	of al	kali	nity o	of wate	er (No	eutra	liza	tion T	itration)							
3.	Estimation of	of D	isso	lved	Oxyge	n in '	wate	er (Io	odome	etric Titra	ation).						
4.	Estimation of	of Cl	hlor	ide c	ontent	in w	ater	(Arg	genton	netry).							
5.	Demonstrati	ion (	of p	H me	ter & j	pH m	etric	c titr	ation.								
6.	Determinati	on o	of st	rengt	h of ac	id/ba	ise c	ondı	ictom	etrically.							
7.	Colorimetric	c est	ima	tion	of Cop	per.											
8.	Estimation of	of co	oppe	er fro	m Bro	nze. (	Iodo	omet	ric Ti	tration).							
9.	Estimation of	of Zi	n fro	om B	rass (I	Displa	ncem	nent '	Titrati	ion).							
10	). Determinati	on o	of pu	arity	of Iron	(Rec	lox 7	Fitra	tion).								
11	. Determinati	on o	of vi	scosi	ty of g	iven	liqui	id. B	y Ost	wald vis	comete	er.					
12	2. Determinati	on o	of co	orrosi	on rat	e by	weig	ght lo	oss me	ethod							
13	. Gravimetric	estir	mati	ion of	f Ba fr	om B	aSO	$_4$ as	BaO.								

Title of the Course: Arduino Based Systems Lab 5EN151	L	Т	Р	Cr
The of the course, means based systems has the term	0	0	2	1
	0	0	2	1
Pre-Requisite Courses:				
No pre-requisite course.				
Textbooks:				
1. "Arduino Cookbook", Michael Margolis, O'Reilly Publications, 202	0			
References:				
1. "Beginning Arduino", Michal Mc Roberts, Second Edition, Apress P	ublishin	g, 2013	3	
2. "Getting started with Arduino", Massimo Banzi, 2 <sup>nd</sup> Edition, O'Rei	ly, 2011	l		
Course Objectives :				
• To demonstrate and facilitate students to learn the fundamentals of d	gital sys	stems a	nd op-a	mps
which are necessary for Arduino based simple systems.				
• To explain, demonstrate the Arduino programming language and IDI	Ξ			
• To illustrate and demonstrate programing for basic Arduino systems.				
• To illustrate and facilitate to build the prototype circuits and connect	them to	the Ar	duino fo	or
building useful systems				-
Course Learning Outcomes:				
Course Learning Outcomes:				

СО	After the completion of the course the student should be	Bloom's	Cognitive
	able to	Level	Descriptor
CO1	Install Arduino IDE, Run the arduino executable file, Using IDE to prepare Arduino sketch.	Π	Describe
CO2	Interface various sensors with Arduino	III	Demonstrate
CO3	Use Arduino to build specific application/system.	III	Use

## **CO-PO Mapping :**

	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3													
CO2		3												
CO3				2										

## Assessments :

## **Teacher Assessment: Lab Assessment:**

There are four components of lab assessment, LA1, LA2, LA3 and Lab ESE. IMP: Lab ESE is a separate head of passing

Assessment	Based on	Conducted by	Conduction and Marks Submission	Marks
I A 1	Lab activities,	Lab Course Feeulty	During Week 1 to Week 4	25
LAI	attendance, journal	Lab Course Faculty	Submission at the end of Week 5	23
1 4 2	Lab activities,	Lab Course Feeulty	During Week 5 to Week 8	25
LAZ	attendance, journal	Lab Course Faculty	Submission at the end of Week 9	23
I A 2	Lab activities,	Lab Course Feeulty	During Week 10 to Week 14	25
LAS	attendance, journal	Lab Course Faculty	Submission at the end of Week 14	23

	Lab ESE	Lab Performance and related documentation	Lab Course faculty	During Week 15 to Week 18 Submission at the end of Week 18	25
0					
С	ourse Con	tents:			
T	he course i	includes experiments base	ed on:		
	1.	Writing a program to blink	the onboard LED		
	2.	Arduino interfacing with T	ricolor LED and Pus	h button	
	3.	Sensing analog voltage usin	ng onboard ADC and	printing it on serial monitor	
	4.	Using Arduino to generate	Pulse width modulat	ion output	
	5.	Arduino-based servo motor	r control		
	6.	Interfacing of ultrasonic dis	stance sensor( HC-SI	R04) with Ardiuno	
	7.	Ethernet and WiFi Connect	tivity with Arduino		
	8.	Arduino interfacing with T	ricolor LCD		
Μ	odule wis	e Measurable Students Le	arning Outcomes :		

From all experiments students will be able to write and execute input / output programming of Arduino for sensors interface and motor control.

Title of the Courses Biology For Engineers (588101)	L	Т	Р	Cr
The of the Course: Diology For Engineers (5D5101)	2	0	0	2

## Pre Requisite: Nil

#### **Textbooks:**

- 1. P. S. Verma and V. K. Agarwal, Concept of Cell Biology, S. Chand and Company Ltd, 2002.
- 2. R. D. Vidyarthi and P. N. Pandey, A Text book of Zoology, S. Chand and Company Ltd, 2004.
- 3. T. S. Ranganathan, Text book of Human Anatomy, S. Chand and Company Ltd, 2002.

## **References:**

- 1. Peter H. Raven, George B. Johnson, Biology, McGraw hill, 11<sup>th</sup> edition, 2017.
- 2. Engelbert Buxbaum, Fundamentals of Protein Structure and Function, Springer, 2007.
- 3. Surinder Kumar, Essentials of Microbiology, Jaypee Brothers Medical Publishers (P) Ltd, 2016.
- 4. Laurence A. Cole, Biology of Life Biochemistry, Physiology and Philosophy, Elsevier, 2016.
- 5. V. Sreekrishna, Comprehensive Biotechnology I Cell Biology and Genetics, New Age, 2005.

## **Course Objectives:**

- 1. Provide a foundation in basic biological principles.
- 2. Develop an understanding of the modern biological concepts and their applications to engineering and life.
- 3. Describe the stages of biological evolution on Earth and the interrelation ships among the living organims.

## **Course Learning Outcomes:**

CO	After the completion of the course the student should be able to	Bloo	m's Cognitive
CO		level	Descriptor
CO1	Identify the characteristics and basic needs of living organisms and explain	п	Un denston din e
	the mechanisms of evolution in living organisms.	11	Understanding
con	Outline the structure of the biomolecules and describe the structure and	п	Understonding
02	function of cells including the metabolic reactions that occur in cells.	11	Understanding
	Describe the chromosome theory, molecular genetics as well as identify		<b>TT 1 1</b>
CO3	microorganisms and their role in various environments.	11	Understanding

## **CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)**

РО	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1						1	1							
CO2							1	1						
CO3							1							

#### Assessments:

#### **Teacher Assessment:**

Two components of In-Semester Evaluation (ISE), One Mid-Semester Examination (MSE) and one End-Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

**ISE 1** and **ISE 2** are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

**ESE**: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Module 1 : Introduction and Classification	Hrs.
<ul> <li>Introduction: History and Significance of Biology.</li> <li>Evolution: Origin of life; Biological evolution.</li> <li>Five kingdom classification; Need for classification, Salient features and classification of Monera, Protista, Fungi, Plantae and Animalia, Lichens, Viruses and Viroids.</li> </ul>	03
Module 2 : Molecular Biology	Hrs.
<b>Cell theory and cell as the basic unit of life</b> : Structure of Prokaryotic (Typical Bacterial Cell) and Eukaryotic cell (Plant cell and animal cell) <b>Cell organelles</b> : Structure and function of endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, micro bodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure and function). Nucleus: nuclear membrane, chromatin, nucleolus. <b>Cell division</b> : Cell cycle, mitosis, meiosis and their significance.	05
Module 3 : Genetics	Hrs.
<b>Introduction</b> : Chromosomes, DNA, RNA, Genes, Genetics, Transcription and Translation in prokaryotic and eukaryotic cell <b>Inheritance</b> : Mechanisms of inheritance, Unifactorial Inheritance, Multifactorial inheritance, Sex-linked Inheritance.	04
Module 4 : Macromolecular Analysis and Protein Structure	Hrs.
<b>Biomolecules</b> : Structure and function of proteins (primary secondary, tertiary and quaternary structure), carbohydrates, lipid, nucleic acids; <b>Enzymes</b> : Types, properties, enzyme action: - Lock and Key hypothesis, Induced fit hypothesis.	04
Module 5 :Bioenergetics and Metabolism	Hrs.
<ul> <li>Bioenergetics: Thermodynamics –First law of thermodynamics, second law of thermodynamics, Gibbs free energy, endergonic &amp; exergonic reactions,</li> <li>ATP: Structure, properties and energy currency of the cell.</li> <li>Introduction to Metabolism - Catabolism, anabolism, catabolic, anabolic and amphibolic pathways Carbohydrate Metabolism: Introduction, Aerobic and anaerobic pathways: Glycolysis and its regulation, Gluconeogenesis and its regulation. TCA cycle, amphibolic &amp; anaplerotic reactions, production of ATP, Photosynthesis – 'light' and 'dark' reactions: C4-pathway.</li> <li>Lipid Metabolism: Beta – oxidations of saturated &amp; unsaturated fatty acids. Ketone bodies, Biosynthesis of fatty acids – Acetyl-CoA carboxylase reaction, Fatty acid synthase complex, Regulation of fatty acid biosynthesis. Biosynthesis of cholesterol.</li> <li>Amino Acid Metabolism: Biodegradation of amino acids – deamination, transamination, decarboxylation, urea cycle including its regulation. Biosynthesis of amino acids, Disorders of amino acid metabolism.</li> </ul>	07
Module 6 : Microbiology	Hrs.
Introduction, Concept of single celled organisms, Concept of species and strains, Identification and Classification of microorganisms, Microscopy, Ecological aspects of single celled organisms, Sterilization and media compositions.	05

## Module Wise Measurable Students Learning Outcomes:

## Module 1 : Introduction and Classification

Identify and describe levels of organization and related functions in plants and animals, their characteristics and basic needs. Explain the classification and the stages of biological evolution on Earth and the interrelation ships among the living organims and development process in individuals and populations.

## Module 2 : Molecular Biology

Describe the structure and function of eukaryotic and prokaryotic cells and explain the structure and function of endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, micro bodies; Cytoskeleton, cilia, flagella, centrioles (ultrastructure and function). Nucleus: nuclear membrane, chromatin, nucleolus. including the metabolic reactions that occur in cells. And discuss the process of cell division in both somatic and germ cells.

## Module 3 : Genetics

Outline and explain the chromosome theory, molecular genetics and quantitative and evolutionary genetics. Discuss the function, replication and evolution of genomes. Describe Transcription and Translation in prokaryotic and eukaryotic cell Explain the process of inheritance.

## Module 4 : Macromolecular Analysis and Protein Structure

Identify the structure of the biomolecules found in all living organisms. Describe how RNA, DNA and proteins are synthesized and describe the types and properties of enzymes and enzyme action.

## Module 5 :Bioenergetics and Metabolism

Explain the fundamental energetics of biochemical processes and the chemical logic of metabolic pathways. Recognize the basic mechanisms of pathway regulation. Discuss the processes of metabolic transformation at the molecular level.

#### Module 6 : Microbiology

Describe cellular, biochemical, and physiological aspects of microorganisms Explain cellular and biochemical processes involved in pathogenesis (human-pathogen interactions). Identify microorganisms and their role in various environments. Describe the cultural use of microorganisms in food production, medicine, fuel production, and waste treatment.

Title of the Courses, I IEE SCIENCE (5DS104)	L	Т	Р	Cr
The of the Course: LIFE SCIENCE (SDS104)	2	0	0	2

## Pre requisite: NIL

#### **Textbooks:**

- 1. T. S. Ranganathan, Text book of Human Anatomy, S. Chand and Company Ltd, 2002.
- 2. P. S. Verma and V. K. Agarwal, Concept of Cell Biology, S. Chand and Company Ltd, 2002.
- 3. R. D. Vidyarthi and P. N. Pandey, A Text book of Zoology, S. Chand and Company Ltd, 2004.

#### **Reference Books:**

- 1. Bruce Alberts and Alexander Johnson, Molecular Biology of the Cell Garland Science, Taylor & Francis Group, 6th Edition, 2015.
- 2. Peter H. Raven, George B. Johnson, Biology, McGraw hill, 11<sup>th</sup> edition, 2017.
- 3. Laurence A. Cole, Biology of Life Biochemistry, Physiology and Philosophy, Elsevier, 2016.
- 4. V. Sreekrishna, Comprehensive Biotechnology I Cell Biology and Genetics, New Age, 2005.

## **Course Objectives:**

- 1. Introduce students to modern aspect of life science.
- 2. Develop an understanding if scientific methods with a broad background in the life sciences at all levels of biological organization (from molecular, cellular, and organismal biology, to populations, communities and ecosystems)
- 3. Provide a foundation of basic biological principles aned education in life science technologies.

## **Course Learning Outcomes:**

CO	After the completion of the course the student should be able to	<b>Bloom's Cognitive</b>		
CO		level	Descriptor	
CO1	Outline and describe cytological, biochemical, physiological and genetic aspects of the cell,	II	Understanding	
CO2	Explain the structure and function of organ systems in the human body and describe the concept, practice and significance of immunity.	II	Understanding	
CO3	Relate knowledge of Bio chemistry, Biotechnology and Bioinformatics with application areas in Engineering.	II	Understanding	

## **CO-PO Mapping : (Use 1, 2, 3 as Correlation Strengths)**

РО	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1						1	1							
CO2							1	1						
CO3							1							

#### Assessments:

#### **Teacher Assessment:**

Two components of In-Semester Evaluation (ISE), One Mid-Semester Examination (MSE) and one End-Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

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MSE: Assessment is based on 50% of course content (Normally first three modules)

**ESE**: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Module 1 : Cell Biology	Hrs.
Structure and function of prokaryotic (Typical Bacterial Cell) and eukaryotic cell (Plant cell and	
animal cell) and intracellular organelles. Mechanism of cell division including (mitosis and meiosis)	03
and cell differentiation; Cell-cell interaction.	
Module 2 : Bio Chemistry	Hrs.
Structure of atoms, molecules and chemical bonds, Principles of physical chemistry, Thermodynamics,	
kinetics, dissociation and association constants, Nucleic acid structure, genetic code, replication, transcription and translation in prokaryotic and eukaryotic cell, Structure, function and metabolism of carbohydrates, lipids and proteins, Enzymes and coenzyme.	04
Module 3 : Human Physiology	Hrs.
a. Digestive system - Digestion, absorption, energy balance	
b. Respiratory system: Comparison of respiration in different species, anatomical considerations,	
transport of gases, exchange of gases, waste elimination, neural and chemical regulation of	
respiration.	
c. Neural system: Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central	
and peripheral nervous system, neural control of muscle tone and posture.	
d. Excretory system: Comparative physiology of excretion, kidney, urine formation, urine	09
concentration, waste elimination, micturition, regulation of water balance, blood volume, blood	
pressure, electrolyte balance, acid-base balance.	
e. Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, specialized tissue,	
ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure,	
f. Endocrinology and reproduction - Endocrine glands, basic mechanism of hormone action, hormones	
and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation	
Module 4 : Immunity	Hrs.
Antigen and Antibody: Introduction, definition and types of Antigens, Structure and functions of	
different classes of immunoglobulins, Primary and secondary immune response, Lymphocytes and	04
accessory cells, Humoral and cell mediated immunity, Mechanism of immune response and generation	•••
of immunological diversity; Application of immunological techniques.	
Module 5 : Biotechnology And Its Applications	Hrs.
Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).	
Application of Biotechnology in health and agriculture: Production of secondary metabolites/products:	
Insulin, growth hormones: Indol acetic acid, interferons. Methods of gene transfer in plants,	04
improvement. Introduction to trangenics: gene therapy, Genetically modified organisms	
Biosafety issues– Bio piracy.	
Module 6 : Bioinformatics and its Applications	Hrs.
Introduction and Definition of Bioinformatics, Molecular Bio informatics: Genomics, Proteomics and	
Drug Design. Organic and Community Bioinformatics: Bioinformatics of species diversity.	
Applications of Bioinformatics: Human health, Microbial genome application, Biotechnology,	04
Agriculture, Comparative studies.	

## Module 1 : Cell Biology

Describe the intricate relationship between various cellular structures and their corresponding functions. Explain the cytological, biochemical, physiological and genetic aspects of the cell, including cellular processes common to all cells, to all eukaryotic, prokaryotic cells as well as processes in certain specialized cells. Relate normal cellular structures to their functions.

## Module 2 : Bio Chemistry

Outline structure of atoms, molecules and chemical bonds. Describe principles of physical chemistry, thermodynamics and kinetics. Explain the structure, function and metabolism of carbohydrates, lipids and proteins, Enzymes and coenzyme.

## Module 3 : Human Physiology

Outline and describe structure and function of major organ systems in the human body, the neural system and explain the transmission of signals in excitable cells.

## Module 4 : Immunity

Identify major components of the immune system at organ, cellular and molecular levels and discuss normal functions of these components during immune responses. Elucidate the relationship between major cellular and molecular components of the immune system. Explain adverse functions of these cellular and molecular components during abnormal circumstances. Describe mechanisms of diseases associated with adverse functions of the immune system.

## Module 5 : Biotechnology And Its Applications

Explain the theory and practice of recombinant DNA technology. Describe biocatalysis, pathway engineering, bioprocess control and downstream processing and Identify the applications of Biotechnology.

## Module 6: Bioinformatics and its Applications

Outline the flow and regulation of biological information. Explain the techniques used to collect sequence and expression data. Identify appropriate biological data bases for specific analyses and describe the applications of Bioinformatics