Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I & II			
Course Code					
Course Name		**Engineering Physics**			
Desired Requisites:		Students are expected to know the basic concept in Physics.			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To provide basic concepts to solve many engineering and technical issues.
2	To give deep insights into the understanding of engineering courses.
3	To encourage them to understand engineering and technical development.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	State Kepler's law, Planks quantum hypothesis, de-Broglie's law, Compton effect, Heisenberg's uncertainty principle, Describe optical phenomenon such as interference, diffraction polarization and in terms of wave model. Schrödinger's wave equations, Hall effect, Fermi-Dirac statistics. Seebeck effect	Remembering
CO2	Explain Planck's quantum hypothesis, Schrödinger's wave equations and their applications; Explain the methods of production and detection methods of ultrasonic waves and its applications, Show motion of particle under central force field, Discuss two body problem, energy equation and diagram,	Understanding
CO3	Classify transducers, and sensors and their applications. Classify solids on the basis of band theory; Explain fermi level and its behavior in metal, semiconductor and insulator. Solve the problems on electrical Conductivity and Hall effect.	Applying

Module	**Course Contents**	**Hours**
I	**Optics:** 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.	7
II	**Quantum Physics:** 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.	7
III	**Ultrasonics:** 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.	7
IV	**Solid State Physics:** Introduction, formation of energy bands in solid, classification of solid on the basis of band theory, number levels in band, density	6

	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.	
V	**Gravitation and Central Force Motion:** 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.	8
VI	**Computer Instrumentation:** 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.	6

Text Books	
1	M. N. Avadhanulu and P. G. Kshirsagar, "*A Text book of Engineering Physics* ", S.Chand Pub.
2	R. K. Gaur and S. L. Gupta *"Engineering Physics",* Dhanpat Rai Publications, 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.
4	P. M. Mathews, K. Venkatesan, *"Text Book of Quantum Mechanics",* Tata McGraw Hill
5	M.K Harbola, *"Engineering Mechanics",* Cengage 2nd edition, 2013.
6	D. Kleppner & R. Kolenkow, *"An Introduction to Mechanics",* McGraw Hill Education,
Useful Links	
1	For optics https://nptel.ac.in/courses/122/107/122107035/
2	For Quantum Physics https://nptel.ac.in/courses/122/106/122106034/
3	For Ultrasonics https://freevideolectures.com/course/3531/engineering-physics-i/8
4	For Solid State Physics https://nptel.ac.in/courses/115/105/115105099/
5	For Gravitation http://digimat.in/nptel/courses/video/115107121/L11.html
6	Basics of Instrumentation https://www.youtube.com/watch?v=qbKnW42ZM5c

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2														
CO2	2														
CO3	2														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember	8	8	24	40
2	Understand	8	8	24	40
3	Apply	4	4	12	20
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	0	0	0	0
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I			
Course Code					
Course Name		Engineering Mathematics- I			
Desired Requisites:		Students are expected to know the basic concept in Mathematics.			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	1 Hrs/week	20	20	60	100
Practical	-				
Interaction	-	**Credits: 4**			

Course Objectives	
1	To develop mathematical skills and enhance thinking power of students.
2	To introduce fundamental concepts of mathematics and their applications in engineering fields

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Illustrating mathematical concepts in engineering field.	Understanding
CO2	Use mathematical and computational methods to solve problems in science and engineering field	Applying

Module	**Course Contents**	**Hours**
I	**Matrices:** 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.	6
II	**Calculus:** Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorem with remainders, L'hospital rule and indeterminate forms	6
III	**Complex Number:** 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.	7
IV	**Partial Differentiation and its application :** 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.	8
V	**First order ODE and its application**: Exact, Linear, Bernoulli's equations, Euler's equations, Orthogonal trajectory, applications to simple electric circuit.	8
VI	**Curve tracing:** Tracing of curves for Cartesian and polar coordinate.	5

Text Books	
1	A Text Book of Applied Mathematics, Vol I and II", P. N. and J. N. Wartikar, Vidyarthi Griha Prakashan, Pune, 2006.
2	Higher Engineering Maths", B .S. Grewal, Khanna Publication, 2005, 39th Edition.

References	
1	Advanced Engineering Mathematics", Erwin Kreyszig, Wiley Eastern Limited Publication, 1978, 1st Edition
2	Advanced Engineering Mathematics", Wylie C.R., Tata McGraw Hill Publication, 1999, 8th Edition.
3	Advanced Engineering Mathematics", H. K. Dass, S. Chand & Company Ltd., 1988, 1st Edition

Useful Links

1	https://engineering-computer-science.wright.edu
2	https://www.classcentral.com/course/edx-introduction-to-engineering-mathematics
3	https://nptel.ac.in/courses/111/105/111105035/
4	https://nptel.ac.in/courses/122/104/122104017/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2														
CO2	2														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember	5	5	20	30
2	Understand	10	10	20	40
3	Apply	5	5	20	30
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	0	0	0	0
Total		**20**	**20**	**60**	**100**

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Mechanics			
Desired Requisites:		Knowledge of higher secondary level Physics			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To impart knowledge of mechanics concepts applicable to civil and mechanical engineering.
2	To illustrate behavior of static bodies using mechanics concepts.
3	To provide knowledge of motions, forces and work energy principles and its engineering applications.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Apply laws and basic concepts of mechanics of rigid bodies.	Understanding
CO2	Analyze system of forces in Statics and Dynamics.	Analyzing
CO3	Apply concept of mechanics to solve engineering problems.	Applying

Module	**Course Contents**	**Hours**
I	**Equilibrium of Forces**: 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 beams- Types of loads and supports. Friction-Laws of friction, equilibrium of bodies on inclined plane, applications- problem involving wedges, ladders etc.	8
II	**Virtual work and Moment of inertia:**Principle of Virtual work-applications to statically determinate simple and compound beams. Centre of gravity and Centroid, Moment of inertia, Radius of gyration, Mass-Moment of inertia.	6
III	**Analysis of plane frames:** Pin-jointed statically determinate plane trusses-Assumptions, imperfect, perfect and redundant trusses, Analysis of statically determinate trusses, method of joints, method of sections and graphical method.	6
IV	**Kinematics of particles:** 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, Relation between linear and angular motion.	7
V	**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.	7
VI	**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.	6

Text Books	
1	Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing Company Limited, 2008.
2	Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age International Publishers, 2015, 5th Edition.
3	Khurmi. R. S., "Textbook of Applied Mechanics", Tata McGraw Hill Publishing Company, 2013, 20th Revised Edition.
References	
1	Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II", McGraw Hill Company Publication, 2011, 9th Edition.
2	Singer, F. L. "Engineering Mechanics Statics & Dynamics", B. S. Publications, 2011.
3	Timoshenko, S. and Young, D. H. "Engineering Mechanics", McGraw Hill Companies, 2008, 4th Edition.
Useful Links	
1	https://nptel.ac.in
2	https://www.coursera.org/learn/engineering-mechanics-statics
3	https://swayam.gov.in/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											1		
CO2	3	2											1		
CO3	3	2											1		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		T1	T2	ESE	Total
1	Remember	0	0	0	**0**
2	Understand	10	10	30	**50**
3	Apply	05	05	15	**25**
4	Analyze	05	05	15	**25**
5	Evaluate	0	0	0	**0**
6	Create	0	0	0	**0**
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Communication Skills			
Desired Requisites:		Higher Secondary Level			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	1 Hrs/week	20	20	60	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	Inculcate the importance of Technical English Communication Skills
2	Enhance their communicative competence
3	Enable the students to communicate with clarity and precision
4	Prepare the students to acquire structure and written expression required for their profession and enable them to acquire proper behavioral skills

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Communicate clearly, precisely and competently in different scenario	Applying
CO2	Demonstrate the information through oral , written and graphic messages	Understanding
CO3	Acquire basic proficiency in English including reading and listening comprehension ,writing and speaking skills	Remembering

Module	**Course Contents**	**Hours**
I	**Module 1: Sentence Structure and Vocabulary Building:** Subject Verb Agreement, Modal verbs, Question tags, Connectives, Synonyms, Antonyms and Standard abbreviations, Redundancies, Misplaced Modifiers Passives.	5
II	**Module 2 : Fundamentals of Communication:** Features and Functions, Importance of Communication, The Communication Process, Barriers and Breakdown of Communication, Communication in an Organization, Upward communication, Downward communication, Horizontal communication, Diagonal communication, Informal communication / Grapevine communication.	3
III	**Module 3 : Nature and Style of Writing :** Describing, Defining, Classifying, Providing examples or evidence, Writing Introduction and Conclusion	3
IV	**Module 4 : A. Non Verbal Communication :** Kinesics or Body Language, Proxemics : Space Distance, Haptic, Chronemics, Nonverbal Barriers. **Vocalic** : **Paralinguistic features: 1.**Pitch 2.Volume 3.Pauses 4. Rate of words/minute **B. Listening Skills:-** 1.Process of Listening 2.Types of Listening 3. Barriers to effective Listening	4
V	**Module 5 : A. Oral Communication:-** 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. Improper Pronunciation 2. Classification of Sounds in English 3. Word Stress 4. Sentence Stress or Intonation 5. Pronunciation and Articulation	5
VI	**Module 6 : Writing Communication** **A. Basic Writing Skills : 1.**Paragraph Writing 2. Comprehension 3.Essay Writing 4.Sentence Structures 5. Use of phrases & clauses in sentences	8

	6.Importance of proper punctuations 7. Creating coherence 8.Organising the principles of paragraphs in documents 9.Techniques for writing precisely **B. Business Correspondence** : 1. Job Applications 2. Complaint Letters and Adjustment Letters 3. Inquiry and Order **C**. **Official Correspondence : 1**. Memorandums 2. Circulars 3. Notices **D** .**Report Writing** : 1. Individual Report 2. Lab Report 3. Inspection Reports	

Text Books	
1	Sanjay Kumar, Pushplata , *Communication Skills*, Oxford University Press, First edition ,2012
2	Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hills publishing Company 2006
References	
1	K.R.Laxminarayanan, English for Technical Communication, Scitech, Sixth Edition, 2008
2	William Sanborn Pfeiffer ,T.V.S. Padmaja ,*Technical Communication: A Practical Approach,* Pearson, Sixth Edition 2012
3	A.K.Jain, Praveen Bhatia, A.M.Shaikh, *Professional Communication Skills,* S. Chand and Co: Fifth edition ,2009
4	F.T.Wood,Remedial English Grammar, Macmillan, 2007
5	Andrea J.Rutherford,Phd. *Basic Communication Skills for Technology*, Pearson Education Asia,2001
6	Exercises in Spoken English, Parts 1 and II CIEFL, Hyderabad , Oxford University Press
Useful Links	
1	www.oupinheonline.com
2	www.scitechpblications.com

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3					
CO2										2					
CO3										2					

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember	10	10	24	44
2	Understand	10	10	36	56
3	Apply	0	0	0	0
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	0	0	0	0
Total		**20**	**20**	**60**	**100**

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Programming For Problem Solving.			
Desired Requisites:		Basic course of software and hardware programming.			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	To imbibe an understanding of programming.
2	To develop problem-solving skills to translate text described problems into programs written using the Programming language with the help of language constructs.
3	To impart knowledge on general principles of computer languages such as: conditional branching, loops, block structures, functions, and input/output.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Paraphrase the basics of programming	Understanding
CO2	Convert the algorithms to programs	Understanding
CO3	Apply programming language principles and constructs to solve problems	Applying

Module	**Course Contents**	**Hours**
I	**Introduction to Programming** 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: Flowchart/Pseudocode with examples. From algorithms to programming Language: source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.	04
II	**Arithmetic expressions, Precedence constraints, Conditional Branching & Loops** **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 Conditional **Branching & Loops:** Statements and blocks, if and switch statements, Loops ,while, do-while and for statements, break, continue, goto and labels.	04
III	**Arrays** Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional arrays, Character arrays, Strings, and applications of arrays.	05
IV	**Functions and Recursion** Designing structured programs, Functions basics, parameter passing, call by value, idea of call by reference, storage classes like extern, auto, register, static, scope rules, block structure, user defined functions, Recursion with examples.	04
V	**Pointers, Structures and Union** 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	05

	of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, and unions.	
VI	**Introduction to File handling** Input and output - concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling.	04

Text Books	
1	Byron Gottfried, Schaum's, "Outline of Programming with C", McGraw-Hill, Third edition, 2017.
2	Yashavant Kanetkar, "Let Us C", BPB Publication, Fifteenth edition, 2016.
3	E. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education, Seventh edition, 2016.
References	
1	Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India, Second Edition, 2015.
Useful Links	
1	http://www.learnvern.com/course/c-tutorials/
2	https://www.udemy.com/c-programming-for-beginners/
3	https://www.geeksforgeeks.org/c-programming-language/
4	https://codeforwin.org/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1													
CO2	2	1													
CO3	3	2	1												

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember		10	5	15
2	Understand	10	10	10	30
3	Apply	10		10	20
4	Analyze			15	15
5	Evaluate			10	10
6	Create			10	10
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information

Programme	B.Tech.
Class, Semester	First Year B.Tech., Sem I &II
Course Code	
Course Name	Engineering Mechanics Laboratory.
Desired Requisites:	Engineering Mechanics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To conduct the experiments to verify the principles of mechanics.
2	To execute the graphical methods to verify the analytical solutions.

Course Outcomes (CO) with Bloom's Taxonomy Level

CO1	Demonstrate verification of laws and basic principles of mechanics through experiments.	Applying
CO2	Execute the experiments to verify the laws of mechanics analytically and graphically.	Applying

List of Experiments / Lab Activities

List of Experiments/ Lab Activities- Any Eight 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 of statically determinate Beams.
10.	Graphical solution of pin jointed perfect plane frames.

Text Books

1	Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age International Publishers, 2015, 5th Edition.
2	Khurmi. R. S., "Textbook of Applied Mechanics", Tata McGraw Hill Publishing Company, 2013, 20th Revised Edition.
3	Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing Company Limited, 2008.

References

1	Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II", McGraw Hill Company Publication, 2011, 9th Edition.
2	Singer, F. L. "Engineering Mechanics Statics & Dynamics", B. S. Publications, 2011.
3	Timoshenko, S. and Young, D. H. "Engineering Mechanics", McGraw Hill Companies, 2008, 4th Edition.

Useful Links

1	https://nptel.ac.in
2	https://www.coursera.org/learn/engineering-mechanics-statics
3	https://swayam.gov.in/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2			2										
CO2	3	2			2										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

Assessment Plan based on Bloom's Taxonomy Level

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand	5	5	10	**20**
Apply	10	10	15	**35**
Analyze	15	15	15	**45**
Evaluate				
Create				
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information

Programme	B.Tech.
Class, Semester	First Year B.Tech., Sem I &II
Course Code	
Course Name	Workshop Practices LAB
Desired Requisites:	NA

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

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

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Describe the methods, operations and processes of manufacturing	Apply
CO2	Summarize the simple mechanical systems, machines, equipment's, the basic working of cutting tools for manufacturing.	Analyze
CO3	Use of chemical etching technique for making the PCB for electronic applications.	Evaluate

List of Experiments / Lab Activities

List of Experiments/ Lab Activities- Any Eight Experiments

List of Experiments:

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.)

   In case of mini-projects, drawing, presentations etc, write the relevant details of the same.

Text Books

1	Raghuwanshi B. S.,"A Course in Workshop Technology I",Dhanpat Rai Publications,10th Ed.2009
2	S. K. Hajra Choudhury and A. K. HajraChoudhary,"Workshop Technology" – Vol I [Manufacturing Processes]", , Media Promoters and Publishers Pvt. Ltd., 10th 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

Useful Links

1	https://www.vlab.co.in/broad-area-mechanical-engineering
2	http://vlabs.iitb.ac.in/vlab/labsme.html
3	https://drive.google.com/file/d/1tp5yV2ghp_Slub58S7iKnvvJyoEwQVYq/view

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1				1											
CO2				1											
CO3					1										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

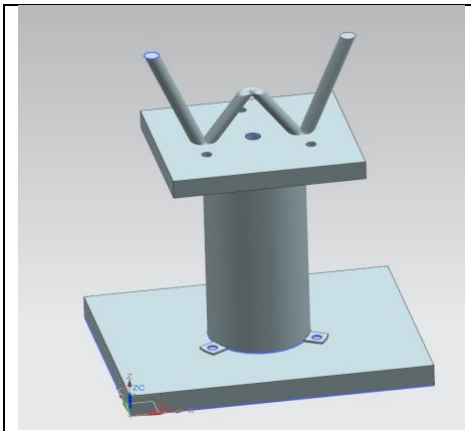
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

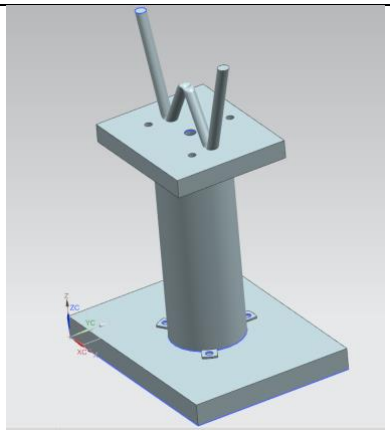
Assessment Plan based on Bloom's Taxonomy Level

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand				
Apply	15	15	20	**50**
Analyze	10	10	10	**30**
Evaluate	5	5	10	**20**
Create				
Total	**30**	**30**	**40**	**100**

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]

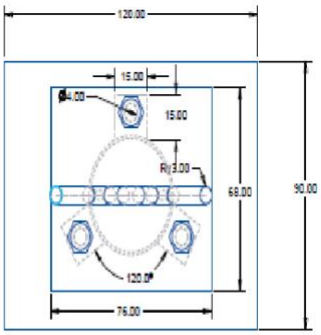


View1



View2

All dimensions are in mm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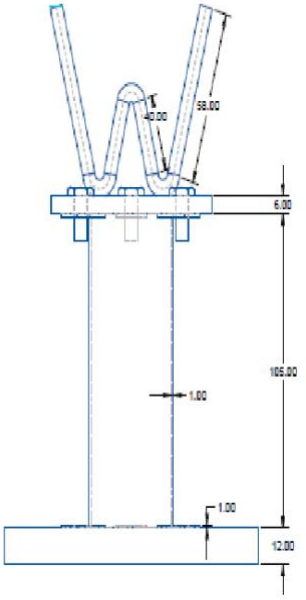
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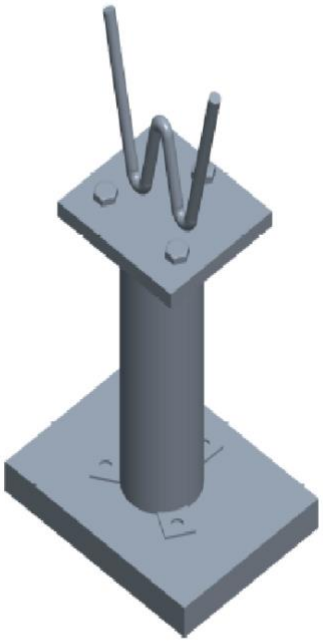

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Programming for Problem Solving Lab			
Desired Requisites:		Basic course of software and hardware programming			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives	
1	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.
2	To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to solve problems.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Illustrate the use of different Language constructs and principles of programming language using a programming environment/tool	Apply
CO2	Implement programs using programming language in a programming environment/using programming tool to solve problems	Apply
CO3	Examine a given program to identify its output	Apply

List of Experiments / Lab Activities	
List of Experiments/ Lab Activities- Any Eight Experiments	
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	Programsto 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

Text Books	
1	Byron Gottfried, Schaum's, "Outline of Programming with C", McGraw-Hill, Third edition,
2	Yashavant Kanetkar, "Let Us C", BPB Publication, Fifteenth edition, 2016.
3	E. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education, Seventh edition,

References	
1	Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, Prentice Hall of India, Second Edition, 2015

Useful Links	
1	http://www.learnvern.com/course/c-tutorials/
2	https://www.udemy.com/c-programming-for-beginners/
3	https://www.geeksforgeeks.org/c-programming-language/
4	https://codeforwin.org/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1				3	2										
CO2				3	2										
CO3				3	2										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

Assessment Plan based on Bloom’s Taxonomy Level

Bloom’s Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember			5	**5**
Understand			5	**5**
Apply	20		10	**30**
Analyze		10	5	**15**
Evaluate	10		5	**15**
Create		20	10	**30**
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Physics Lab.			
Desired Requisites:		Students are expected to know the basic practical knowledge upto HSC			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

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 Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Calculate 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. Demonstrate Hartley and Colpitt's oscillator with their simulations, Newton's ring, and I-V characteristics of semiconductor diode. Kundt's tube.	Applying

List of Experiments / Lab Activities.	
List of Experiments/ Lab Activities- Any Eight Experiments	
1	Find the diameter of the thin wire by diffraction of the light
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.
Text Books	
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.
Useful Links	
1	https://nptel.ac.in/courses/115/105/115105121/
2	https://www.iitg.ac.in/cet/nptel.html
3	http://nptel.ac.in/video.php?subjectId=117106091

CO-PO Mapping For All B.Tech. Programs															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1													
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

Assessment Plan based on Bloom's Taxonomy Level

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember	10	10	15	**35**
Understand	10	10	10	**30**
Apply	10	10	15	**35**
Analyze	0	0	0	**0**
Evaluate	0	0	0	**0**
Create	0	0	0	**0**
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Chemistry			
Desired Requisites:		Chemistry course at secondary and higher secondary level			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To make student familiar with engineering properties associated with different materials to use them successfully in practice.
2	To provide knowledge and significance of characterization and chemical analysis for using materials in different engineering applications.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Explain chemical analysis, thermal analysis, water chemistry, phase rule. Types of polymers and its application and water's industrial applications. Draw schematic of water softeners, phase diagrams, Thermo grams, calorimeter and fuel cells setups.	Understanding
CO2	Classify types of chemical analysis, hard water, polymers, fuel, fuel cells and thermal analysis.	Understanding
CO3	Calculate concentration of solutions, % or GF of analyte gravimetrically, hardness of water, Calorific values	Applying

Module	**Course Contents**	**Hours**
I	**General principles of chemical Analysis -** 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.	8
II	**Water Chemistry** - 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.	5
III	**Phase Rule:** 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.	6
IV	**Polymers-** 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.	7
V	**Thermal Analysis** – Thermal analysis and its types, Thermal events,	

	Thermal analysis methods Thermo gravimetric Analysis (TGA), Differential Thermal Analysis (DTA)and Differential Scanning Calorimetry (DSC) w.r.t. Principle, instrumentation, and applications, Interpretation of Thermogram	6
VI	**Energy Science:** 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.	6

Text Books	
1	S.K. Singh, "Engineering Chemistry", New Age Publication, 3rd Edition , 2005.
2	Shasi Chawla, "Engineering Chemistry", Dhanpat Rai Publication, 3rd Edition , 2003.
3	Jain P.C. and Jain Monika, "Engineering Chemistry", Dhanpat Rai Publication, 16th Edition, 2013
References	
1	O G Palanna, "Engineering Chemistry" Tata McGraw Hill 2009.
2	Mendham, R.C. Denney, J.D. Barnes, M.J.K Thomas, "Quantitative Chemical analysis", Vogel's Pearson Education, 6th Edition , 2008.
3	S.S Dara, "Engineering Chemistry" S. Chand and Company 2008.
4	Askeland and Phule , "The Science and Engineering of Materials" Thomson Publication 4th Edition ,2003
Useful Links	
1	https://edu.rsc.org/resources A free resource for Chemistry teachers and students of all levels, including higher education, hosted by Royal Society of Chemistry.
2	https://www.digimat.in/nptel/courses/video/122106028/L01.html
3	https://onlinecourses.nptel.ac.in/noc21_cy49/preview
4	https://www.coursera.org/browse/physical-science-and-engineering/chemistry

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2														
CO2	2														
CO3	2														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember	6	6	20	32
2	Understand	8	8	25	41
3	Apply	6	6	15	27
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	0	0	0	0
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem II			
Course Code					
Course Name		Engineering Mathematics- II			
Desired Requisites:		Students are expected to know the basic concept in Mathematics.			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	1Hrs/week	20	20	60	100
Practical	-				
Interaction	-	**Credits: 4**			

Course Objectives	
1	To develop mathematical skills and enhance thinking power of students.
2	To introduce fundamental concepts of mathematics and their applications in engineering fields

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Illustrating mathematical concepts in engineering field.	Understanding
CO2	Use mathematical and computational methods to solve problems in science and engineering field	Applying

Module	**Course Contents**	**Hours**
I	**Beta-Gamma Functions:** Definition of Beta, Gamma functions and properties of Beta Gamma functions.	5
II	**Multivariable Calculus:** 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.	10
III	**Numerical Solution of Ordinary Differential Equations of first order 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.	6
IV	**Probability theory**: Introduction, Sample Space, Events, Axioms of probability, Conditional probability Baye's Theorem	6
V	**Statistics:** Correlation, Regression, Curve-fitting.	6
VI	**Probability Distribution:** Random Variable, Binomial distribution, Poisson distribution, Normal distribution.	7

Text Books	
1	A Text Book of Applied Mathematics, Vol I and II", P. N. and J. N. Wartikar,
2	Higher Engineering Maths", B .S. Grewal, Khanna Publication, 2005, 39th Edition.
3	Fundamentals of Mathematical Statistics and probability S.C. Gupta 2014 ,S. Chand &Sons

References	
1	Advanced Engineering Mathematics", Erwin Kreyszig, Wiley Eastern 1st edition 1978
2	Advanced Engineering Mathematics", Wylie C.R., Tata McGraw Hill 1999, 8th Edition.
3	Advanced Engineering Mathematics", H. K. Dass, S. Chand ,1988, 1st Edition
4	Engineering Mathematics (Vol.-I)", S. S. Sastry, Prentice Hall Publication, 2006, 3rd Edition.

Useful Links	
1	https://engineering-computer-science.wright.edu
2	https://www.classcentral.com/course/edx-introduction-to-engineering-mathematics
3	https://nptel.ac.in/courses/111/105/111105035/
4	https://nptel.ac.in/courses/122/104/122104017/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2														
CO2	2														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember	5	5	20	30
2	Understand	10	10	20	40
3	Apply	5	5	20	30
4	Analyze	0	0	0	0
5	Evaluate	0	0	0	0
6	Create	0	0	0	0
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Graphics and AutoCAD			
Desired Requisites:		Basic Knowledge of Different Types of Curves			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	Introduce students to the conventions, concepts and basic principles of Engineering Drawing.
2	Draw projections of geometrical objects and real life components.
3	Demonstrate graphics skill for communication of concepts, ideas and design of engineering products

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Understanding Principles of Engineering and Computer Graphics	Understanding
CO2	Outline projection of engineering objects	Understandinge
CO3	Demonstrating Principles of Engineering, Computer Graphics through drafting software	Demonstrating

Module	**Course Contents**	**Hours**
I	**Introduction to Engineering Drawing** 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	4
II	**Orthographic Projections** Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Problems from the above units should also be practiced on computer aided drafting software	5
III	**Projections of Regular Solids Sections and Sectional Views of Right Angular Solids** Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only) Problems from the above units should also be practiced on computer aided drafting software	4
IV	**Isometric Projections** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;	4

	Problems from the above units should also be practiced on computer aided drafting software	
V	**Introduction to Computer Aided Sketching** Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. of HP, VP, RPP & LPP. of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.	5
VI	**Annotations, layering & other functions** Applying dimensions to objects, applying annotations to drawings; Setting up and use of 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. 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. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;	4

Text Books	
1	Bhatt N.D., Panchal V.M. and Ingle P.R., Engineering Drawing, Charotar Publishing House, 2014.
2	Shah, M.B. and Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008.
3	Agrawal B. and Agrawal C. M., Engineering Graphics, TMH Publication, 2012.
References	
1	Narayana, K.L. and P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008.
2	Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2010
3	Fredderock E. Giesecke, Alva Mitchell others, Principles of Engineering Graphics, Maxwell McMillan Publishing, 2010
Useful Links	
1	https://nptel.ac.in/courses/112/103/112103019/
2	https://nptel.ac.in/courses/105/104/105104148/
3	https://www.youtube.com/watch?v=xXdpkQXDuMw&list=PL9RcWoqXmzaJT-fliqTSwUjWU4zCX_H2A

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3				2					1		1	2		
CO2			2												
CO3					3					1					

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level		**T1**	**T2**	**ESE**	**Total**
1	Remember				
2	Understand	5	5	20	30
3	Apply	10	10	30	50
4	Analyze	5	5	10	20
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Basic Electrical Engineering			
Desired Requisites:					
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives	
1	To summarize and solve electrical and magnetic circuits.
2	To imparts skill to identifying principles, construction and working of electrical machines.
3	To develops skill to describe the wiring system, lamps and low voltage installation components.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	**Explain** principles, construction and working of electrical machines. .	Understand
CO2	**Solve** electrical and magnetic circuits. .	Apply

Module	**Course Contents**	**Hours**
I	**DC Circuits:-** Review of R-L-C- Electrical circuit elements, KCL and KVL. Star- delta conversion, voltage and current sources. Thevenin, Norton and Superposition, Maximum power transfer Theorems.	6
II	**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..	5
III	**DC Machines:-**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
IV	**Transformers:-**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.	7
V	**AC Machines:-**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
VI	**Wiring, Electrical Installations and Components of LT Switchgear** 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.	6

Text Books	
1	D.C. Kulshreshtha, "*Basic Electrical Engineering*", 1st revised edition McGraw Hill, 2012.
2	D. P. Kothari and I. J. Nagrath, "*Basic Electrical Engineering*", Tata McGraw Hill, 2010.
3	B.L Theraja,"*A Textbook of Electrical Technology*", S Chand Publication, 2013.

References	
1	V. D. Toro, *"Electrical Engineering Fundamentals*", Prentice Hall India, 1989.
2	E. Hughes, *"Electrical and Electronics Technology"*, Pearson, 2010.
3	V. N. Mittle and Arvind Mittal, "*Basic Electrical Engineering*", 2nd edition TMH, 2006.

Useful Links	
1	https://nptel.ac.in/courses/108/105/108105053/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3														
CO2		3													

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		T1	T2	ESE	Total
1	Remember				
2	Understand		10	40	50
3	Apply	20	10	20	50
4	Analyze				
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Arduino Based Systems			
Desired Requisites:		No pre-requisite course.			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	To explain and illustrate the fundamentals of digital systems and op-amps which are necessary for Arduino based simple systems.
2	To explain, demonstrate the Arduino programming language and IDE
3	To illustrate and demonstrate programing for basic Arduino systems.
4	To illustrate how to build the prototype circuits and connect them to the Arduino for building useful systems.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Explain fundamentals of digital systems and operational amplifiers	Understand
CO2	Illustrate the fundamentals of Arduino, installation of Arduino IDE, Running the arduino executable file, Using IDE to prepare Arduino sketch	Understand
CO3	Writing programs for interfacing various sensors and output devices with Arduino	Apply
CO4	Illustrate use of Arduino for an application or a system	Analyze

Module	**Course Contents**	**Hours**
I	**Overview of Digital Systems:-**Combinational Circuits- Adder, Subtractor, Multiplexer, Demultiplexer / Decoder, Sequential CircuitsFlip flops: S-R, D, Clocked flipflop, J-K Flip flop, Counters: Synchronous and Asynchronous, MOD –N Counters, Shift Registers, Memory Block	5
II	**Operational amplifiers:-**Block Diagram, Basic Operations, Op-Amps as comparator, Op amp in feedback mode, Inverting/ Noninverting Amplifier, Adder/ Subtractor	5
III	**Introduction to Arduino:-**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
IV	**Input/Output Programming:-**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
V	**Input/Output Programming:-**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
VI	**Arduino Applications:-**Case studies : Arduino based robot car, Arduino based PLC industrial application	3

Text Books	
1	"Arduino Cookbook", Michael Margolis, O'Reilly Publications, 2020
References	
1	"Beginning Arduino", Michal Mc Roberts, Second Edition, Apress Publishing, 2013
2	"Getting started with Arduino", Massimo Banzi, 2nd Edition, O'Reilly, 2011
Useful Links	
1	
2	
3	

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3														
CO2		3													
CO3			2												
CO4		2													

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		T1	T2	ESE	Total
1	Remember				
2	Understand	10	10	20	**40**
3	Apply	10	10	20	40
4	Analyze			20	20
5	Evaluate				
6	Create				
Total		**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Life Science (Elective)			
Desired Requisites:		-Nil-			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**T1**	**T2**	**ESE**	**Total**
Tutorial	-	20	20	60	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	Introduce students to modern aspect of life science.
2	Develop an understanding of 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 and education in life science technologies.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Outline and describe cytological, biochemical, physiological and genetic aspects of the cell,	Understanding
CO2	Explain the structure and function of organ systems in the human body and describe the concept, practice and significance of immunity.	Understanding
CO3	Relate knowledge of Bio chemistry, Biotechnology and Bioinformatics with application areas in Engineering.	Understanding

Module	**Course Contents**	**Hours**
I	**Cell Biology :** **Introduction to Cell structure and functions** Structure and function of prokaryotic cell (Typical Bacterial Cell) and eukaryotic cell (Plant cell and animal cell) and intracellular organelles, Mechanism of cell division including (mitosis and meiosis) and cell differentiation; Cell-cell interaction.	3
II	**Bio Chemistry :** **Introduction to 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.	4
III	**Human Physiology:** **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 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,	9

	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.	
IV	**Immunity:** **Introduction, definition and types of Immunities and Antigens**, **Immunoglobulins**: Structure and functions of different classes of immunoglobulins, Primary and secondary immune response, Lymphocytes and accessory cells, Humoral and cell mediated immunity, Mechanism of immune response and generation of immunological diversity, Application of immunological techniques.	4
V	**Biotechnology and Its Applications:** **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**: Indoleacetic acid, interferons. Methods of gene transfer in plants, crop improvement. **Introduction to transgenics**: Gene therapy, Genetically modified organisms Biosafety issues– Bio piracy.	4
VI	**Bioinformatics and its Applications:** Introduction and Definition of Bioinformatics, **Molecular Bioinformatics**: Genomics, Proteomics and Drug Design. **Organic and Community Bioinformatics**: Bioinformatics of species diversity. **Applications of Bioinformatics**: Human health, Microbial genome application, Biotechnology, Agriculture, Comparative studies**.**	4

Text Books	
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.
References	
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, 11th edition, 2017.
3	Laurence A. Cole, Biology of Life - Biochemistry, Physiology and Philosophy, Elsevier, 2016.
Useful Links	
1	https://www.youtube.com/watch?v=yaQhH9iKY0M
2	https://www.youtube.com/watch?v=V6s0xOTNmT4
3	https://www.youtube.com/watch?v=5Q9LgvQs5Nw
4	https://www.youtube.com/watch?v=nzJXq4YMPYE
5	https://www.youtube.com/watch?v=ssIBNVLSG58
1	https://www.youtube.com/watch?v=yaQhH9iKY0M

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						**1**	**1**								
CO2							**1**	**1**							
CO3							**1**								

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Graphics and AutoCAD Lab			
Desired Requisites:		Basic Knowledge of Computer			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives	
1	To impart the techniques of engineering graphics using the CAD software
2	To prepare the students for applying knowledge of engineering graphics in real life drawings using CAD software
3	To develop the skills of students for evaluating CAD software for its applications

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Understand the basic principle of Engineering graphics and working of CAD software.	Understanding
CO2	Draw different views of components using the CAD software.	Applying
CO3	Apply the knowledge of engineering graphics in real life applications.	Applying

List of Experiments / Lab Activities.	
1	Plane Curves and Conic Sections (Min. 5 Problems)
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)

Text Books	
1	Bhatt N.D., Panchal V.M. and Ingle P.R., Engineering Drawing, Charotar Publishing House, 2014
2	Shah, M.B. and Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008.
3	Agrawal B. and Agrawal C. M., Engineering Graphics, TMH Publication, 2012.

References	
1	Narayana, K.L. and P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008.
2	Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2010
3	Fredderock E. Giesecke, Alva Mitchell others, Principles of Engineering Graphics, Maxwell McMillan Publishing, 2010

Useful Links	
1	https://nptel.ac.in/courses/112/103/112103019/
2	https://nptel.ac.in/courses/105/104/105104148/
3	https://www.youtube.com/watch?v=xXdpkQXDuMw&list=PL9RcWoqXmzaJT-fliqTSwUjWU4zCX_H2A

CO-PO Mapping For All B.Tech. Programs															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3				2					1		1	2		
CO2			2												
CO3					3					1					
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

Assessment Plan based on Bloom's Taxonomy Level

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember				
Understand	10	10	10	**30**
Apply	15	15	20	**50**
Analyze	5	5	10	**20**
Evaluate				
Create				
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information

Programme	B.Tech.
Class, Semester	First Year B.Tech., Sem I &II
Course Code	
Course Name	Basic Electrical Engineering Lab
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To demonstrate basic knowledge of Electrical engineering.
2	To develop skills to recognize working principle, construction and types of electrical machines.

Course Outcomes (CO) with Bloom's Taxonomy Level

CO1	**Describe** basic concepts of electrical circuits and various theorems.	**Remember**
CO2	**Demonstrate** the use of transformers and AC/DC machines.	**Apply**

List of Experiments / Lab Activities.

1	To study AC and DC machines parts and their functions.
2	To study series-parallel RL, RC and RLC circuits
3	To verify KVL and KCL theorems.
4	Study of AC/DC motor starters
5	To study speed control techniques of ac and dc machines
6	To perform load test on transformer.
7	To study servo motor/ steeper motor with application
8	Study of installation techniques using fuse, MCB and MCCB.

Text Books

1	D.C. Kulshreshtha, *"Basic Electrical Engineering",* 1st revised edition McGraw Hill, 2012.
2	D.P Kothari and I.J Nagrath, *"Basic Electrical Engineering"* ,Tata McGraw Hill, 2010.

References

1	V. N. Mittle and Arvind Mittal, "*Basic Electrical Engineering*", 2nd edition, Tata McGraw Hill.

Useful Links

1	https://nptel.ac.in/courses/108/105/108105053/

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3														
CO2	3								2						

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Lab. Course)				
There are three components of lab assessment, LA1, LA2 and Lab ESE. **IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.**				
Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.				

Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember	25	15	10	**50**
Understand				
Apply	5	15	30	**50**
Analyze				
Evaluate				
Create				
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

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AY 2021-22

Course Information					
Programme		B.Tech.			
Class, Semester		First Year B.Tech., Sem I &II			
Course Code					
Course Name		Engineering Chemistry Lab.			
Desired Requisites:		Chemistry course at secondary and higher secondary level			
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives		
1	To make the student familiar with analytical techniques.	
2	To provide hands on practice of titrimetric analysis.	
Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	**Apply** principles of Volumetry to quantitative analysis of water quality parameter, metal and alloys. **Demonstrate** use of instrument for quantitative analysis. **Experiment** physical/Chemical characteristics of material.	Applying
List of Experiments / Lab Activities.		
1	Estimation of hardness of water by EDTA method (Complexometric Titration).	
2	Estimation of alkalinity of water (Neutralization Titration).	
3	Estimation of Dissolved Oxygen in water (Iodometric Titration).	
4	Estimation of Chloride content in water (Argentometry).	
5	Demonstration of pH meter & pH metric titration.	
6	Determination of strength of acid/base conductometrically.	
7	Colorimetric estimation of Copper.	
8	Estimation of copper from Bronze. (Iodometric Titration).	
9	Estimation of Zn from Brass (Displacement Titration).	
10	Determination of purity of Iron (Redox Titration).	
11	Determination of viscosity of given liquid. By Ostwald viscometer.	
12	Determination of corrosion rate by weight loss method	
13	Gravimetric estimation of Ba from BaSO4 as BaO.	
Text Books		
1	College Practical Chemistry, V K Ahaluwaliya.Sunita Dhingra,Adarsha Gulati, Universities Press.	
2	Laboratory Manual on Engineering Chemistry by Sudha Rani And S.K. Bashin, Dhanpat Rai & Co.	
References		
1	Engineering Chemistry Laboratory Manual, Department of Chemistry WCE, Sangli.	
2	J Mendham, R.C. Denney, J.D. Barnes, M.J.K Thomas, "Quantitative Chemical analysis", Vogels, Pearson Education, 2008, 6th Edition.	
Useful Links		
1	https://www.lccc.edu/academics/science-and-engineering/science-in-motion/labs-equipment/chemistry-lab-experiments	
2	https://edu.rsc.org/resources/collections/classic-chemistry-experiments	

CO-PO Mapping For All B.Tech. Programs															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1													
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															

Assessment (for Lab. Course)

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.

Assessment Plan based on Bloom's Taxonomy Level

Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total
Remember	10	10	15	**35**
Understand	10	10	10	**30**
Apply	10	10	15	**35**
Analyze	0	0	0	**0**
Evaluate	0	0	0	**0**
Create	0	0	0	**0**
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2021-22

Course Information					
Programme	B.Tech.				
Class, Semester	First Year B.Tech., Sem I &II				
Course Code					
Course Name	Arduino Based Systems Lab				
Desired Requisites:	-				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives	
1	To demonstrate and facilitate students to learn the fundamentals of digital systems and op-amps which are necessary for Arduino based simple systems.
2	To explain, demonstrate the Arduino programming language and IDE
3	To illustrate and demonstrate programing for basic Arduino systems
4	To illustrate and facilitate to build the prototype circuits and connect them to the Arduino for building useful systems.

Course Outcomes (CO) with Bloom's Taxonomy Level		
CO1	Install Arduino IDE, Run the arduino executable file, Using IDE to prepare Arduino sketch.	Apply
CO2	Interface various sensors with Arduino	Analyze
CO3	Use Arduino to build specific application/system.	Evaluate

List of Experiments / Lab Activities.	
1	Writing a program to blink the onboard LED
2	Arduino interfacing with Tricolor LED and Push button
3	Sensing analog voltage using onboard ADC and printing it on serial monitor
4	Using Arduino to generate Pulse width modulation output
5	Arduino-based servo motor control
6	Interfacing of ultrasonic distance sensor(HC-SR04) with Ardiuno
7	Ethernet and WiFi Connectivity with Arduino
8	Arduino interfacing with Tricolor LCD

Text Books	
1	"Arduino Cookbook", Michael Margolis, O'Reilly Publications, 2020

References	
1	"Beginning Arduino", Michal Mc Roberts, Second Edition, Apress Publishing, 2013
2	"Getting started with Arduino", Massimo Banzi, 2nd Edition, O'Reilly, 2011

Useful Links

CO-PO Mapping For All B.Tech. Programs

	Programme Outcomes (PO)												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3														
CO2		3													
CO3				2											

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment (for Lab. Course)				
There are three components of lab assessment, LA1, LA2 and Lab ESE. **IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.**				
Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. 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.				

Assessment Plan based on Bloom's Taxonomy Level				
Bloom's Taxonomy Level	**LA1**	**LA2**	**Lab ESE**	**Total**
Remember				
Understand				
Apply	20	15	20	**55**
Analyze	10	10	10	**30**
Evaluate		5	10	**15**
Create				
Total	**30**	**30**	**40**	**100**

GROUP A SEM-I

Course Name	Theory Hrs.	Tutorial HRs	LAB. Hrs.	Credits	Category
Engineering Physics	3	--	--	3	BS
Engineering Mathematics- I	3	1	--	4	BS
Engineering Mechanics	3	--	--	3	ES
Communication Skills	2	1	--	3	HS
Programming For Problem Solving	2	--	--	2	BS
Engineering Mechanics Lab.	--	--	2	1	ES
Workshop Practice	--	--	2	1	ES
Programming For Problem Solving Lab.	--	--	2	1	ES
Physics Lab.	--	--	2	1	BS
TOTAL	**13**	**2**	**8**	**19**	

GROUP A SEM-II

Course Name	Theory Hrs.	Tutorial HRs	LAB. Hrs.	Credits	Category
Engineering Chemistry	3	--	--	3	BS
Engineering Mathematics- II	3	1	--	4	BS
Engineering Graphics and AutoCAD	2	--	--	2	ES
Basic Electrical Engineering	3	--	--	3	ES
Arduino Based System	2	--	--	2	ES
Life Science	2	--	--	2	HS
Engineering Graphics and AutoCAD Lab.	--	--	2	1	ES
Basic Electrical Engineering Lab.	--	--	2	1	ES
Chemistry Lab.	--	--	2	1	BS
Arduino Based System Lab.	--	--	2	1	ES
TOTAL	**15**	**1**	**8**	**20**	

GROUP B SEM-I

Course Name	Theory Hrs.	Tutorial HRs	LAB. Hrs.	Credits	Category
Engineering Chemistry	3	--	--	3	BS
Engineering Mathematics- I	3	1	--	4	BS
Engineering Graphics and AutoCAD	2	--	--	2	ES
Basic Electrical Engineering	3	--	--	3	ES
Arduino Based System	2	--	--	2	ES
Life Science	2	--	--	2	HS
Engineering Graphics and AutoCAD Lab.	--	--	2	1	ES
Basic Electrical Engineering Lab.	--	--	2	1	ES
Chemistry Lab.	--	--	2	1	BS
Arduino Based System Lab.	--	--	2	1	ES
TOTAL	**15**	**1**	**8**	**20**	

GROUP B SEM-II

Course Name	Theory Hrs.	Tutorial HRs	LAB. Hrs.	Credits	Category
Engineering Physics	3	--	--	3	BS
Engineering Mathematics- II	3	1	--	4	BS
Engineering Mechanics	3	--	--	3	ES
Communication Skills	2	1	--	3	HS
Programming For Problem Solving	2	--	--	2	BS
Engineering Mechanics Lab.	--	--	2	1	ES
Workshop Practice	--	--	2	1	ES
Programming For Problem Solving Lab.	--	--	2	1	ES
Physics Lab.	--	--	2	1	BS
TOTAL	**13**	**2**	**8**	**19**	