Bharati Vidyapeeth
Deemed to be University,
College of Engineering Pune

Ref. no. BVDU/ / /2019-20 **Date : 26/09/2020**

Subject: Minutes of Meeting of Board of Studies in Electrical Engineering 26/09/2020 for B.Tech Robotics and Automation programme.

Sir,

A meeting of the members of Board of studies in Electrical Engineering was held (online) on 26/09/2020 at Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune at 11.30 AM.

The following members of the board were present

1. Dr. D.S. Bankar : Chairman
2. Dr .R.M. Holmukhe : Member
3. Dr. P. B. Karandikar : Member
4. Mrs. S. U. Kulkarni : Member
5. Mrs. R. S. Ambekar : Member
6. Mr. S. A. Namekar : Member
7. Mr. Santosh Tamke : Member (Director Sensycon Controls)
8. Mr. Zalte Uttam G : Member (Former Director : Operations MSCTCL)

Also following invitee members were present for the meeting :

1. Mr. Swapnil Talathi : Design Project Manager, Precision Automation & Robotics India ltd
2. Mr. Sameer Burjade : Controls Design-Manager - Precision Automation & Robotics India ltd.
3. Mr. Vikram Deshmukh : Technical Director, Leotechsa
4. Prof. K B Sutar : HoD and BoS Chairman Mechanical Engineering
5. Prof. Mrs A A Shinde : HoD and BoS Chairman Electronics Engineering & E & TC
6. Prof. S B Vanjale HoD and BoS Chairman Computer Engineering & IT
9. Prof. S S Ghule HoD and BoS Chairman Basic sc. & Humanities.
10. Prof. S D Lembhe HoD Production Engineering.

The following points were discussed in the meeting,

1] Confirmation of the minutes of the previous meeting held on 05/09/2020

Resolution : The minutes of the earlier meeting held on 05/09/2020 were read and confirmed.

2] Approval of structure of B.Tech Robotics and Automation Sem I to Sem VIII.

The inputs regarding the course structure was received from various industries working in Robotics and Automation like Precision Automation & Robotics India ltd., Control Technique Nidec, UK division, Sensycon Controls Pune, Eminent educationists etc. As per the directives received in the Faculty of Engineering Meeting held on 19/09/2020, committee formed by Dean FOE has conducted multiple meetings and after brain storming sessions, proposed the structure and syllabus of B.Tech Robotics and Automation.

Resolution : The aspects of proposed curriculum were discussed in the meeting. Accordingly the proposed structure of B.Tech Robotics and Automation Sem – I to Sem – VIII was discussed in detail and approved the same with minor changes. Also the suggestions received from all the industry experts and alumni were discussed in the meeting. The proposed structure of B.Tech Robotics & Automation Sem – I to Sem – VIII is attached in annexure I.

3] Approval of syllabus of B.Tech Electrical sem – I & sem II.

Resolution : The proposed curriculum is structured towards the branch specific and accordingly sufficient no. of courses were included in the Sem I & II.

Respective BoS / subject chairman has presented and discussed proposed curriculum of following courses.

Sr. No.	Subject Title	Name of BoS / subject chairman presented the syllabus
1	Engineering Mathematics – I	Prof. S S Ghule
2	Engineering Physics	
3	Open Course 1	
4	Engineering Mathematics – II	
5	Engineering Chemistry	
6	Open Course 2	
7	Engineering Graphics	Prof. K B Sutar
8	Fundamentals of Design & Manufacturing Engineering	
9	Workshop Technology	Prof. S D Lembhe
10	Production Practices	
11	Electronic Devices & Circuits	Prof. A A Shinde
12	Fundamentals of Electrical Engineering	Prof. S A Namekar
13	Electrical & Electronic Measurement techniques	Prof. R S Ambekar
14	Problem Solving with Simulation & Programming	Prof. R M Holmukhe

The curriculum of above courses have been approved after discussion.

The curriculum of Engineering Mechanics submitted by BoS Civil has been accepted and approved the same.
The proposed syllabus of above courses is attached in annexure II.

The meeting was concluded with the vote of thanks proposed by the chair.

Prof. Dr. D. S. Bankar
Chairman Board of Studies
Electrical Engineering
Bharati Vidyapeeth (Deemed to be) University, Pune.

Bharati Vidyapeeth Deemed to be University, Pune

Faculty of Engineering & Technology

Board of Studies (Electrical Engineering)

Programme : B.Tech (Robotics & Automation Engineering) (2020 Course)

Sr. No.	Semester	Total Marks	Total Credits	Total Credits of year
1	I	750	25	50
2	II	750	25	
3	III	750	25	50
4	IV	750	25	
5	V	750	25	50
6	VI	750	25	
7	VII	750	25	50
8	VIII	750	25	
	Total	6000	200	200

Sr. No.	Course Type	Course Type Description	No. of Courses	Total Marks	Total Credits	% Contribution
1	BSC	Basic Science Course	05	550	22	11
2	ESC	Engineering Science Course	03	235	09	4.5
3	PCC	Professional Core Course	25	3335	100	53
4	PEC	Professional Elective Course	06	1000	34	14
5	OEC	Open Elective Course	06	360	12	06
6	SBC	Skill Based Course	08	450	19	9.5
7	HSMC	Humanities/Social Sciences/Management Courses	02	120	04	02
8	MLC	Mandatory Learning Course	02	200	00	00
Total						6000

Bharati Vidyapeeth Deemed to be University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Robotics & Automation Engineering) Sem – I (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
1	BSC	Engineering Mathematics – I	3	--	1	60	40	--	--	--	100	4	--	--	--	4
2	ESC	Engineering Graphics	4	2	--	60	40	25	--	--	125	4	1	--	--	5
3	BSC	Engineering Physics	3	2	--	60	40	25	--	--	125	3	1	--	--	4
4	PCC	Fundamentals of Electrical Engineering	4	2	--	60	40	25	--	25	150	4	0.5	--	0.5	5
5	ESC	Engineering Mechanics	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
6	HSMC	Open Course 1 (Business communication)	2	--	--	50	--	--	--	--	50	2	--	--	--	2
7	ESC	Workshop Technology	--	2	--	--	--	50	--	--	50	--	1	--	--	1
		Total	19	10	1	350	200	150	25	25	750	20	4	0.5	0.5	25

Programme : B.Tech (Robotics & Automation Engineering) Sem – II (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
8	BSC	Engineering Mathematics – II	3	--	1	60	40	--	--	--	100	4	--	--	--	4
9	PCC	Electronic Devices & Circuits	3	2	--	60	40	25	--	--	125	3	1	--	--	4
10	BSC	Engineering Chemistry	3	2	--	60	40	25	--	--	125	3	1	--	--	4
11	PCC	Electrical & Electronic Measurement techniques	3	2	--	60	40	25	--	--	125	3	1	--	--	4
12	PCC	Fundamentals of design & manufacturing engineering	3	2		60	40	25	--	--	125	3	1	--	--	4
13	PCC	Problem Solving with Simulation & Programming	--	4	--	--	--	50	--	--	50	--	2	--	--	2
14	HSMC	Open Course 2	2	--	--	50	--	--	--	--	50	2	--	--	--	2
15	SBC	Production Practices	--	2	--	--	--	50	--	--	50	--	1	--	--	1
		Total	17	12	1	350	200	200	--	--	750	18	6.5	--	0.5	25

Total Credits Sem – I : 25
Total Credits Sem – II : 25
Grand total : 50

Programme : B.Tech (Robotics & Automation Engineering) Sem – III (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
16	BSC	Engineering Mathematics –III	3	--	1	60	40	--	--	--	100	4	--	--	--	4
17	PCC	Digital Electronics	4	2	--	60	40	25	--	25	150	4	0.5	--	0.5	5
18	PCC	Transducers& Instrumentation	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
19	PCC	Strength of machine elements	3	2	--	60	40	25	--	--	125	3	0.5	0.5	--	4
20	PCC	Robotic materials	3	2	--	60	40	25	--	--	125	3	0.5	0.5	--	4
21	OEC	Open Course 3	2	--	--	50	--	--	--	--	50	2	--	--	--	2
22	SBC	Computer Aided Drafting	--	2	--	--	--	25	25	--	50	--	1	1	--	2
		Total	18	10	1	350	200	125	50	25	750	19	3	2.5	0.5	25

Programme : B.Tech (Robotics & Automation Engineering) Sem – IV (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
23	PCC	Control Systems- I	4	2	--	60	40	25	25	--	150	4	0.5	0.5	--	5
24	PCC	Electrical Machines	4	2	--	60	40	25	--	--	150	4	0.5	--	0.5	5
25	PCC	Kinematics and Dynamics of Machines	3	2	1	60	40	25	--	--	150	4	0.5	--	0.5	5
26	PCC	Advanced manufacturing processes	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
27	PCC	Computer Architecture	3	--	--	60	40	--	--	--	100	3	--	--	--	3
28	OEC	Open Course 4	2	--	--	50	--	--	--	--	50	2	--	--	--	2
29	SBC	Numerical Methods with Python Programming	2	2	--	--	--	25	--	25	50	--	1	--	--	1
		Total	21	10	1	350	200	125	50	25	750	20	3	1	1	25

Additional Compulsory Subject

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme					Credits		
			L	P	T	ESE	Continuous Assessment		Practical		Total	Theory	TW	Total
									TW PR	TW OR				
30	MLC	Environmental Studies	2	--	--	50	--	--	--	--	50	--	--	--

Total Credits Sem – III : 25
Total Credits Sem – IV : 25
Grand total : 50

Programme :B.Tech (Robotics & Automation Engineering) Sem – V (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
31	PCC	Microcontrollers	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
32	PCC	PLC, SCADA & HMI	3	2	--	60	40	25	--	25	150	3	0.5	--	0.5	4
33	PCC	Hydraulics and Pneumatics	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
34	PEC	Professional Elective – I	3	2	--	60	40	--	--	--	125	3	0.5	0.5	--	4
35	PCC	Design of Machine Elements and Transmission Systems	3	2	--	60	40	25	--	--	100	3	0.5	0.5	--	4
36	OEC	Open Course 5	2	--	--	50	--	--	--		50	2	--	--	--	2
37	SBC	Internship 1 (45 Days)	--	--	--	--	--	25	--	--	25	--	1.5	1.5	--	3
		Total	17	8	--	350	200	125	50	25	750	17	4	3.5	0.5	25

Programme : B.Tech (Robotics & Automation Engineering) Sem – VI (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
38	PCC	Control System-II	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
39	PCC	Power Electronics and Drives	4	2	--	60	40	25	--	--	125	4	0.5	0.5	--	5
40	PCC	Embedded Controllers and Real time Operating Systems	3	2	--	60	40	25	--	--	125	3	0.5	0.5	--	4
41	PEC	Professional Elective – II	3	2	--	60	40	--	--	--	100	3	0.5	0.5	--	4
42	PCC	Principles of Robotics	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
43	OEC	Open Course 6	2	--	--	50	--	--	--	--	50	2	--		--	2
44	SBC	**Mini Project	--	2	--	--	--	25	25	--	50	--	1	1	--	2
		Total	18	12	-	350	200	125	75	--	750	18	3.5	3.5	--	25

Additional Compulsory Subject

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme					Credits		
			L	P	T	ESE	Continuous Assessment		Practical		Total	Theory	TW	Total
									TW PR	TW OR				
45	MLC	Disaster Management	2	--	--	50	--	--	--	--	50	--	--	--

Total Credits Sem – III : 25

Total Credits Sem – IV : 25

Grand total : 50

Programme : B.Tech (Robotics & Automation Engineering) Sem – VII (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
46	PCC	Industrial Robots and Automation systems	4	2	--	60	40	25	25	--	150	4	0.5	0.5	--	5
47	PEC	Professional Elective – III	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
48	PCC	Machine Vision Systems	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
49	PEC	Professional Elective – IV	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
50	OEC	Open Course 7	2	--	--	50	--	--	--	--	50	2	--	--	--	2
51	SBC	Internship 2 (45 Days)	--	--	--	--	--	25	25	--	50	--	2	2	--	4
52	SBC	***Project Stage – I	--	2	--	--	--	25	25	--	50	--	1	1	--	2
		Total	15	10	--	290	160	150	150	--	750	15	5	5	--	25

Programme : B.Tech (Robotics & Automation Engineering) Sem – VIII (2020 Course)

Sr. No.	Category of Courses	Name of Course	Teaching Scheme			Examination Scheme						Credits				
			L	P	T	ESE	Continuous Assessment	Practical			Total	Theory	TW	OR	PR	Total
								TW	OR	PR						
53	PCC	Modeling and Simulation	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
54	PCC	Robotic Programming	4	2	--	60	40	25	25	--	150	4	0.5	0.5	--	5
55	PEC	Professional Elective – V	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
56	PEC	Professional Elective – VI	3	2	--	60	40	25	25	--	150	3	0.5	0.5	--	4
57	OEC	Open Course 8	2	--	--	50	--	--	--	--	50	2	--	--	--	2
58	SBC	*****Project Stage – II	--	6	--	--	--	50	50	--	100	--	3	3	--	6
		Total	15	14	-	290	160	150	150	--	750	15	5	5	--	25

Total Credits Sem – VII : 25
Total Credits Sem – VIII : 25
Grand total : 50

Electives:

Sem	Professional Electives	Electrical	Electronics	Mechanical	Production (Robotics Manufacturing)	Computer	Information Technology	Civil
Sem V	Professional Elective I	Static and Mobile Robots	Digital System Design	Automobile Engineering	Totally Integrated Automation	Intelligent Robots	Human Computer Interaction	Building Automation
Sem VI	Professional Elective II	Tuning of Multiple Axes Robots	Digital Signal Processing	Micro Electro Mechanical Systems	Robotics based Industrial Automation	Data Science in Robotics	Artificial Intelligence	Use of Robotics in Building Construction
Sem VII	Professional Elective III	Data Mining	Digital Image Processing	Computer Integrated Manufacturing Systems	Process planning and cost estimation	Robotics Architecture	Machine Learning	Automation in Construction Quality Control
	Professional Elective IV	Safety in Robotics	Soft Computing	Machine Tool Design	Total quality management	Mobile Robots	Data Analytics	Automation in Project Management
Sem VIII	Professional Elective V	Integration of Safety Tools	Machine Learning	Condition Monitoring and Fault Diagnosis	Lean and agile manufacturing	Security in Robotics & Automation	Image Processing	Traffic Planning and Management
	Professional Elective VI	Nano-3D Printing	Industrial IOT	Nanotechnology & Applications	Jig, Fixture & Die Design	Interactive Medical Robotics	Virtual Reality and Augmented Reality	Automation in Irrigation Systems

List of Open Courses:

Open Course 1	Business Communication
Open Course 2	Soft skill Development
Open Course 3	Industrial Safety Practices
Open Course 4	Introduction to Industrial Standards
Open Course 5	Foreign Language-I
Open Course 6	Foreign Language-II
Open Course 7	Intellectual Property Rights
Open Course 8	Optimization Techniques

Sr. No.	Open course 3	Open course 4
1	Industrial Safety Practices	Introduction to Industrial Standards
2	Introduction to Chemical Engineering	Introduction to Mechanical Engineering
3	Introduction to Civil Engineering	Introduction to Production Engineering
4	Introduction to Computer Engineering	Introduction to Electrical Engineering
5	Introduction to Electronics and communication Engineering	Introduction to IT Engineering
6	Introduction to Computer Science and Business systems Engineering	Introduction to Electronics and Tele-communication Engineering

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY) (INDIA) ,PUNE

B. Tech (Robotics & Automation) Sem-I

ENGINEERING MATHEMATICS- I

Designation: Professional Core

Course Pre-requisites:

Students should have knowledge of

1.	Basic Mathematics

Category : BSC Code: KGAU11

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Lectures : 4 Hours/Week	End Semester Examination : 60 Marks	Theory : 04
Tutorial : 1 Hour /Week	Unit Test : 40 marks	Tutorial : 01
	Total : 100 Marks	Total credits : 05

Course Outcomes:

After completion of the course students will be able to

1.	To solve linear equations and calculate Eigen values, Eigen Vectors.
2.	Apply theorem to find roots of algebraic equations
3.	To solve differential Calculus by expansion of functions.
4.	To solve differential Calculus by infinite series.
5.	Apply partial differentiation theorems on Homogeneous Functions
6.	Find Maxima and Minima of Functions of two variables.

Topics covered

UNIT - I	**Matrices** Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors, Cayley – Hamilton Theorem.Application to problems in Engineering.	**(08 Hours)**
UNIT - II	**Complex Number and Its Applications** Definition, Cartesian, Polar and Exponential Forms ,Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.	**(08 Hours)**
UNIT - III	**Differential Calculus** Successive Differentiation, nth Derivatives of Standard Functions,Leibnitz's Theorem. **Expansion of Functions** Taylor's Series and Maclaurin's Series	**(08 Hours)**
UNIT - IV	**Differential Calculus** Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits. **Infinite Series** Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence,	**(08 Hours)**

	Absolute and Conditional Convergence, Power series, Range of Convergence.	
UNIT - V	**PARTIAL DIFFERENTIATION AND APPLICATIONS** Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables. Errors and Approximations.	**(08 Hours)**
UNIT - VI	**JACOBIAN** Jacobians and their applications, Chain Rule, Functional Dependence. **MAXIMA AND MINIMA** Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.	**(08 Hours)**

Text Books/ References:	
1.	Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune, 7th edition (1988).
2.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).
3.	Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008) .
4.	Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8^{th} edition (1999).
5.	Advanced Engineering Mathematics, 7e, by Peter V. O'Neil, Thomson Learning,6th edition (2007).
6.	Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education, 2nd edition (2002).

ENGINEERING GRAPHICS

Designation of Course	**ENGINEERING GRAPHICS**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory :- 04 Hours/ Week	End Semester Examination	60 Marks	04
Practical :- 02 Hours/ Week	Unit Test	40 Marks	
	Term Work	25 Marks	01
	Oral/~~Practical~~	--	--
	Total	125 Marks	05

Course Prerequisites:-	Knowledge of basic geometry
Course Outcomes:-	1. Different engineering curves and dimensioning. 2. Differentiate Ist angle and IIIrd angle projection Method in orthographic. 3. To interpret views of the object and to draw by using Isometric projection method. 4. Projection of Lines, its traces and planes. 5. Projection of different solids. 6. Development of lateral surfaces of solids.

Course Contents

Unit 1	**Lines and Dimensioning in Engineering Drawing and Engineering Curves**	(08 Hrs.)

Different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

Ellipse by Arcs of Circle method, Concentric circle method. Involutes of a circle, Cycloid, Archimedean Spiral, Helix on cone & cylinder.

Introduction to Auto CAD commands.

Unit 2	**Orthographic Projection**	(08 Hrs.)

Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.

(Also using AutoCAD commands)

Unit 3	**Isometric Projections**	(08 Hrs.)

Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view.

(Also using AutoCAD commands)

Unit 4	**Projections of Points, Lines and Planes**	(08 Hrs.)

Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference

planes. (Lines in First Quadrant Only) Traces of lines,

Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP.

(Also using AutoCAD commands)

Unit 5	**Projection of Solids**	(08 Hrs.)
Projection of prism, pyramid, cone and cylinder by rotation method. (Also using AutoCAD commands)		
Unit 6	**Development of Lateral Surfaces (DLS) of Solids.**	(06 Hrs.)
Introduction to development of lateral surfaces and its Industrial application, draw the development of lateral surfaces of cone, pyramid and prism. (Also using AutoCAD commands)		

Term work

Term work shall consist of half imperial size or A2 size (594 mm x 420 mm) sheets.

All sheets should complete in drawing hall manually and sheet no 2-7 also completed using AutoCAD with printout on A2 size papers.

Sheets

1. Types of lines, Dimensioning practice, free hand lettering, 1ndand 3rd angle methods symbol.
2. Engineering curves.
3. Orthographic Projections.
4. Isometric views.
5. Projections of Points and Lines and planes.
6. Projection of Solids.
7. Development of lateral surfaces.

Text Books/ Reference Books

1. "Elementary Engineering Drawing", N.D. Bhatt, Charotar Publishing house, Anand India,
2. "Text Book on Engineering Drawing", K.L.Narayana & P.Kannaiah, Scitech Publications, Chennai.
3. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi ,
4. "Engineering Drawing and Graphics", Venugopal K., New Age International publishers.
5. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005
6. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005
7. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988

B. Tech (Robotics & Automation)
ENGINEERING PHYSICS

Designation of Course	**Engineering Physics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 3 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 00 Practical: 01
Tutorial : 00 Hours/ Week	Internal Assessment	40 Marks	
	Term Work	25 Marks	
	Oral/Practical Examination	-- Marks	
	Total	125 Marks	4
Course Prerequisite:-	Students are expected to have a basic understanding of physics and calculus.		
Course Objective	After completing this course the students will able to apply knowledge of Engineering Physics to different branches of engineering for better conceptual clarity and exploring emerging fields of technology and research.		
Course Outcomes:-	1. Interpret the basics of semiconductors and its uses to develop electronics devices such as diode. 2. Interpret the properties of lasers and use it to applications like fibre optics and holography. 3. Express knowledge of nanoscience to develop new electronic devices. 4. Interpret the magnetic properties of material. 5. Express the properties of new engineering materials such as shape memory alloys. 6. Analyze the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for Non Destructive Testing. Define the behavior of quantum particles in different potentials.		

Course Contents

Unit 1	Semiconductor Physics	**(6Hrs.)**
Free electron theory, Density of states, Bloch theorem (Statement only), Origin of band gap, Energy bands in solids, Effective mass of electron, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.		
Unit 2	Lasers and Fibre Optics	**(6Hrs.)**
Principle of laser, Einstein's coefficients, Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Properties of lasers, Applications of lasers (Engineering/ industry, medicine, communication, Computers), Holography. Principle and structure of optical fibre, acceptance angle and acceptance cone, numerical aperture, Applications of optic fibre.		
Unit 3	Nanoscience	**(6Hrs.)**
Introductions of nanoparticals, properties of nanoparticals (Optical, electrical, Magnetic, structural, mechanical), Wide band gap semiconductors, Quantum confinement effect, Quantum dots, CNT, Fullerene, synthesis of nanoparticals, synthesis of nanoparticals by physical-ball milling and chemical-co-precipitation, applications in the field of electronics, automobile and medicine.		
Unit 4	Magnetic Materials and Superconductors	**(6Hrs.)**
Origin of magnetic moment , Bohr magneton, Domain theory, comparison of Dia, Para and Ferro magnetism, Hysteresis – soft and hard magnetic materials, antiferromagnetic materials, Ferrites and its applications. Superconductors, properties, Meissner effect, Type I and Type II superconductors, BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.		
Unit 5	Advance Engineering Materials	**(6Hrs.)**
Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Synthesis by pulsed laser deposition and chemical vapour deposition, Applications, NLO materials. Birefringence, optical Kerr effect, Classification of Biomaterials and its applications		
Unit 6	Acoustics and Ultrasonics	**(6Hrs.)**
Elementary acoustics, Reverberation and reverberation time, Sabine's formula, Pressure and Intensity level, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C–scan displays, Medical applications - Sonogram		

Text Books/ Reference Books

1. Engineering Physics, M. N. Avadhanulu and P.G. Kshirsagar, Engineering Physics, S Chand Publication, 9th Edition, 2011.
2. Engineering Physics, R. K. Gaur and S. L. Gupta, Dhanpat Rai Publications.
3. Fundamental of Physics Extended, Halliday and Resnik, Wiley Publication, 10th Edition, 2013.
4. Concept of Modern Physics, Arthur Beizer, McGraw Hill Publication, 6th Edition, 2003.
5. Optics, Ajoy Ghatak, McGraw Hill Publication, 5th Edition, 2012.
6. Science of Engineering Materials, C.M. Srivastava and C. Srinivasan, Wiley Publication.
7. Solid State Physics, A.J. Dekker, Pan MacMillan Publication, 1969.

TERM WORK

Experiments Any eight experiments from the following:

1. Determination of band gap of semi-conductor.
2. Solar cell characteristics.
3. e/m by Thomson's method.
4. Uses of CRO for measurement of phase difference and Lissajos figures.
5. Hall effect and Hall coefficient.
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode, Photo diode, LED, Ge/Si diode).
8. Plank's constant by photodiode.
9. Wavelength by diffraction grating.
10. Wavelength of LASER by diffraction grating.
11. Newton's rings.
12. Ultrasonic interferometer.
13. Sound intensity level measurement.
14. Wavelength of laser by diffraction.
15. Determination of refractive index for O-ray and E-ray.
16. Brewester's law.
17. Synthesis of ZnO nanoparticles by chemical method
18. Laser divergence angle
19. Determination of band gap of synthesized nanoparticles
20. Project based Learning
21. Project based Learning

Assignments:

At least ONE assignment on each unit

B. Tech (Electrical)- Sem-I

FUNDAMENTALS OF ELECTRICAL ENGINEERING		
Designation: Breadth		
Course Pre-requisites:		
1.	Students should have basic knowledge of Physics and Mathematics	
TEACHING SCHEME:		**EXAMINATION SCHEME:**
Lectures: 04 Hours / Week		End Semester Examination : 60 Marks
Practical: 02 Hours / Week		Continuous Assessment : 40 Marks
		Term Work: 25 Marks Practical: 25 Marks
Course Outcomes:		
The students will be able to		
1.	Understand the basic laws and theorems in DC circuits	
2.	Understand concept of phasors and fundamentals of single phase AC circuits	
3.	Interpret the basics of three phase AC circuits and relationships for voltages and currents in star and delta connected systems	
4.	Understand the basic concepts of series and parallel magnetic circuits and single phase transformer	
5.	Classify high conductivity, magnetic and insulting materials.	
6.	Understand causes and effects of electrical hazards, earthing system and IS standards	
Topics covered		
UNIT - I	**DC Circuit Analysis and Network Theorems:** Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation. Kirchhoff's laws; loop and nodal methods of analysis; star-delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem (simple numerical problems).	**(08 Hours)**
UNIT - II	**Steady- State Analysis of Single Phase AC Circuits:** AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel and series-parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems).	**(08 Hours)**
UNIT -III	**Three Phase AC Circuits:** Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relations, three-phase power and its measurement (simple numerical problems).	**(08 Hours)**
UNIT -IV	**Magnetic Circuit:** flux, flux density, field strength, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling. **Electromagnetic Induction:** Faraday's Law of EMI, Induced EMF, Lenz's Law, Self Inductance, Coefficient of Self inductance (L), Mutual inductance, Coefficient of Mutual inductance (M), self induced EMF and mutually induced EMF,	**(08 Hours)**

	Coefficient of Coupling, Inductance in series, Types of inductor, their application and Energy Stored in Magnetic Field	
UNIT -V	**Electrical Engineering Materials** High conductivity materials (Copper, Aluminium, Steel, Iron, alloys of copper), materials used in precision work, magnetic materials and its classification, insulating materials: electrical properties, temperature rise and classification. Dielectric and optical properties of materials, nano-materials.	**(08 Hours)**
UNIT-VI	**Electrical Hazards and safety:** Electrical Hazards: Hazards of electrical energy. Safe limits of amperages, voltages. Safe distance from lines. Capacity and protection of conductor. Joints and connections. Means of cutting off power, Earth insulation and continuity tests. Earthing: Types & Standards. Protection against surge and voltage fluctuation. Hazards arising out of 'borrowed' neutrals. Others precautions. Types of protection for electrical equipment in hazardous atmosphere. Electrical area classification. Criteria in their selection, installation, maintenance and use, IS standards (IS: 5216(Part-1)-1982)for electrical safety. Electricity bill, Tariff and its types.	**(08 Hours)**

List of Practicals to be performed in the laboratory:

1.	Plotting B-H characteristics for a material
2.	Study of R-L series, R-C series , R-L-C series circuit
3.	Time response of R-L series and R-C series circuit
4.	Verification of voltage and current relationships in star and delta connected 3-phase networks
5.	Load test on DC machine
6.	Single lamp controlled by two different switches(staircase)
7.	Two lamps controlled independently from two different switches (parallel)
8.	Series connected lamps
9.	Go-down wiring
10.	Study of Electricity bill(Industrial / commercial)
11	Load test on induction motor
12	To find efficiency and regulation of single phase transformer
13	To find the polarity of a 3-phase transformer

Note:
The term work shall be the record of minimum eight experiments performed from the above list.

Reference Books:

1.	Electrical Technology - Edward Huges (Pearson)
2.	Basic Electrical Engineering - D. P. Kothari, J Nagarath (TMC)
3.	Electrical power system technology - S. W. Fordo, D. R. Patric (Prentice Hall)
4.	Principles of Electronics-Dr. H. M. Rai (SatyaPrakashan)
5.	Electronic Devices and Circuit Theory- R. L. Boylestad and L. Nashelsky (PHI)
6.	Electrical, Electronics Measurements and Instruments - (SatyaPrakashan)
7.	Principles of Communication Engineering - Anokh Singh, A. K. Chhabra (S Chand)

Engineering Mechanics

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 03 Hours / Week	End Semester Examination: 60 Marks Continuous Assessment: 40 Marks	Credits : 03
Practical: 02 Hours / Week	Term Work: 25 Marks Oral: 25 Marks	Credits: 01

Course Pre-requisites: The students should have knowledge of

1	Physics-Forces, Newton's law of motion, Concept of physical quantities, their units and conversion of units, Scalar and Vector
2	Mathematics-Algebra, Geometry, Concept of differentiation and integration

Course Objectives:

	The student should be able to determine effect of forces on rigid object to solve engineering problems.

Course Outcomes: The student will be able to

1	calculate resultant and apply conditions of equilibrium.
2	calculate friction force and its effect.
3	analyze the truss
4	calculate centroid and moment of inertia.
5	evaluate kinematic effect of forces
6	evaluate kinetic effect of forces

Course Content:

UNIT - I	**Resultant and Equilibrium** Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach.. Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane, Force and Couple system about a point.	**(06 Hours)**
UNIT - II	**Friction** Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts.	**(06 Hours)**
UNIT - III	**Analysis of Truss** Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.	**(06 Hours)**
UNIT - IV	**Centroid and Moment of Inertia** Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.	**(06 Hours)**
UNIT - V	**Kinematics of a Particle** Cartesian components, Normal and Tangential components of motion, Relative motion, Dependent motion, Motion of a Projectile,	**(06 Hours)**
UNIT - VI	**Kinetics of a Particle** D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.	**(06 Hours)**

Term Work:

Part- A	The term-work shall consist of minimum **Five** experiments from list below.	
	1) Study of equilibrium of concurrent force system in a plane	
	2) Determination of reactions of Simple and Compound beam.	
	3) Determination of coefficient of friction for Flat Belt.	
	4) Determination of coefficient of friction for Rope.	
	5) Determination of Centroid of line or plane elements.	
	6) Study of Curvilinear motion.	
	7) Determination of Coefficient of Restitution.	
Part- B	The term-work shall also consist of minimum **Five** graphical solutions of the problems on	

	different topics.	

Text Books:
Engineering Mechanics (Statics and Dynamics)",Hibbeler R.C., McMillan Publication
Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Beer F.P. and Johnston E.R., Tata McGraw Hill Publication.
Engineering Mechanics",Bhavikatti S.S. and Rajashekarappa K.G., New Age International (P) Ltd.
Reference Books:
"Engineering Mechanics (Statics and Dynamics)", Shames I.H., Prentice Hall of India (P) Ltd.
"Engineering Mechanics (Statics and Dynamics)", Singer F.L., Harper and Row Publication
Engineering Mechanics (Statics and Dynamics)",Meriam J.L. and Kraige L.G., John Wiley and Sons Publication
"Engineering Mechanics (Statics and Dynamics)",Timoshenko S.P. and Young D.H., McGraw Hill Publication
"Engineering Mechanics (Statics and Dynamics)",Tayal A.K., Umesh Publication
"Engineering Mechanics-I and II (Statics and Dynamics)", Mokashi V.S., Tata McGraw Hill Publication

Business Communication
(All branches) Sem-I

Designation of Course	**Business Communication**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 2 Hours/ Week	End Semester Examination	50 Marks	Theory: 02 Tutorial: 00 Practical: 00
Tutorial : 00 Hours/ Week	Internal Assessment	00 Marks	
	Term Work	00 Marks	
	Oral/Practical Examination	00 Marks	
	Total	60 Marks	2
Course Prerequisites:-	Students should have knowledge of Basic English grammar Students should have basic information of sound system of English language Basics of written communication		
Course Objective	The course objective of Business Communication is to help students understand the basic of English language through application of it in business. The units cover the aspects of functional grammar for inculcating the basics for business communication. It helps students to understand the process of communication in association with different components of communication. It also targets the understanding of different barriers that creep into communication process and different business documentation process.		
Course Outcomes:-	Graduates will able to 01. To construct the error free sentences of English language and do implementation of it in the spoken and written business communication 02. Do applications of sounds of English language for correct pronunciation 03. To understand communication process and principles to do applications in business communication 04. Develop the ability to communicate effectively using suitable styles and techniques of communication 05. Build up the ability to study employment business communication skills and its proper implications 06. To construct effective business presentation and do effective implementation of it through activities		

Course Contents

Unit 1	English grammar:	**(4 Hrs.)**
Forms of tense, articles, preposition, use of auxiliaries and modal auxiliaries, common errors, Vocabulary development through GRAPS-PT, types of sentences voice, direct indirect speech, degree of comparison		
Unit 2	Phonetics/study of sounds in English:	**(4Hrs.)**
Introduction to phonetics, study of speech organs, study of phonetic script, transcriptions of words, articulation of different sound in English, reducing MTI, stress and intonation		

Unit 3	**Communication Skills**	**(4Hrs.)**
Introduction, forms and function of communication process, non-verbal codes in communication, importance of LSRW in communication, Barriers to communication and overcoming them digital communication		
Unit 4	**Mechanics of Written Communication**	**(4Hrs.)**
Developing the mechanics of written communication: principles of effective writing, technical report writing; format, structure and its types, language development through literary text		
Unit 5	Honing employment communication:	**(4Hrs.)**
Job application, building resume and CV, email writing, group discussion, interview skills, meeting formation, notice, agenda, minutes of meeting		
Unit 6	esentation skills:	**(4Hrs.)**
Designing effective presentation, understanding theme, developing content and layout of presentation, use of tone and language, technological tools for effective presentation, developing content for extempore, elocution and public speaking		

Reference Books:

1. Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition,
2. Spoken English- A manual of Speech and Phoonetics by R. K. Bansal, J. B. Harrison published by Orient Blackswan
3. Communication Skills by Sanjay Kumar, Pushp Lata, published by Oxford University press, second edition
4. Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press
5. Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd

Recommended web-links for enhancing English language and business communication

1. http://www.bbc.co.uk/worldservice/learningenglish
2. http://www.englishlearner.com/tests/test.html
3. http://www.hodu.com/default.html
4. http://www.communicationskills.co.in/index.html

Assignments: At least ONE assignment on each unit

Syllabus for Robotics and Automations

Workshop

TEACHING SCHEME: EXAMINATION SCHEME: CREDITS ALLOTTED:

Practical: --2 Hrs/Week TW : 25 Marks 01 Credits

Pre-requisites: Basics of physics ,chemistry , mathematics and measurements.

Course Outcomes:

· To develop a skill in dignity of labour, precision, safety at workplace, team working and development of right attitude.

· To acquire skills in basic engineering practice

· To identify the hand tools and instruments

· To develop general machining skills in the students

Course Objectives

Student Should be able to,

1) Understand the Measuring and Marking systems used in Carpentry Work.

2) Understand the Hot working Processes.

3) Understand the Techniques of Welding.

4) Understand the Machine tools, Mechanisms and Drilling operations.

Instruction and Demonstration: Instruction should be given for each of following shops which include importance of the shop in engineering, new materials available, use of each tool / equipment, methods of processing any special machines, power required etc.

Four Sections

Section 1 – Carpentry (Two Practical's on Pattern making Carpentry Batch Job)

Study of tools & operations and carpentry joints, Simple exercise using jack plane, Simple exercise on woodworking lathe.

Section 2 – Black Smithy and Tin Smithy (3 Practicals on Black Smithy and Tin Smithy-Batch Job)

Study of tools & operations, Simple exercises base on smithy operations such as upsetting, drawing down, punching, bending, fullering & swagin

Section 3 – Welding Processes. (Two Practical's on Welding batch Job)

Study of tools & operations of Gas welding & Arc welding, Simple butt and Lap welded joints, Oxy-acetylene flame cutting.

Section 4 – Machining Processes (Making Batch Job on Lathe Machine And Millng Grinding Process 4 practical)

Study of machine tools and operations, Demonstrations of basic machine tools like Lathe, Shaper, drilling machine with basic operations etc

ENGINEERING MATHEMATICS- II					
Designation: Professional Core					
Course Pre-requisites:					
Students should have knowledge of					
1.	Basic Mathematics				
Category : BSC				Code: KGAU11	
TEACHING SCHEME:		**EXAMINATION SCHEME:**		**CREDITS ALLOTTED:**	
Lectures	: 4 Hours/Week	End Semester Examination	: 60 Marks	Theory	: 04
Tutorial	: 1 Hour /Week	Unit Test	: 40 marks	Tutorial	: 01
		Total	: 100 Marks	Total credits	: 05

Course Outcomes:	
After completion of the course students will be able to	
1.	To solve differential equations by different methods
2.	Apply different laws to solve Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems.
3.	To solve integral calculus and Fourier series
4.	To solve integral calculus with error functions
5.	Draw solid geometry.
6.	Solve multiple integration problems.

Topics covered

UNIT - I	**DIFFERENTIAL EQUATIONS (DE)** Definition, Order and Degree of DE, Formation of DE. Partial Differential Equations, Classification of higher order PDEs. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types.	**(08 Hours)**
UNIT - II	**APPLICATIONS OF DIFFERENTIAL EQUATIONS** Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems. Solution of Higher order ODE with constant and variable coefficients and its applications to boundary and initial value problems	**(08 Hours)**
UNIT - III	**FOURIER SERIES** Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis. **INTEGRAL CALCULUS** Reduction formulae, Beta and Gamma functions.	**(08 Hours)**
UNIT - IV	**INTEGRAL CALCULUS** Differentiation Under the Integral Sign, Error functions. **CURVE TRACING** Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves.	**(08 Hours)**

UNIT - V	**SOLID GEOMETRY** Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.	**(08 Hours)**
UNIT - VI	**MULTIPLE INTEGRALS AND THEIR APPLICATIONS** Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.	**(08 Hours)**
Text Books/ References:		
1.	Applied Mathematics (Volumes I and II) by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune, 7th edition (1988).	
2.	Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).	
3.	Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008) .	
4.	Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8th edition (1999).	
5.	Advanced Engineering Mathematics, 7e, by Peter V. O'Neil, Thomson Learning,6th edition (2007).	
6.	Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education, 2nd edition (2002).	

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. II Robotics & Automation
SUBJECT: - Electronic Devices & Circuits

Teaching Scheme	**Examination Scheme**	
Lecture: 3 Hours/week	**End semester exam:**	**60 Marks**
Practical: 2 Hours/week	**Internal Assessment:**	**40 Marks**
	Termwork:	**25 Marks**
	Total:	**125 Marks**
	Credits:	**Theory: 03**
		Practical: 01

Pre-requisites:

1. Basics of electricity and magnetism
2. Basic mathematics
3. Basics of semiconductor device physics

Course Objectives:

1. To teach the construction, working, ratings and application of passive devices like resistors, capacitors, inductors, transformers and relays
2. Introduce types of voltage and current sources and electrochemical cells
3. To teach the construction, working and ratings of devices like pn junction diode, bipolar junction transistor andMOSFET
4. To teach the basic application circuits like rectifiers, voltage amplifiers and drivers
5. To teach the construction, working and ratings of optoelectronic devices like LDR, LED, phototransistor and photovoltaic cell
6. To introduce the concept of grounding and shielding, to introduce the concept of PCB, types of PCB, PCB fabrication process, Basic PCB design rules, PCB assembly, introduce EDA tools used for PCB artwork design

Course outcomes:

After completing the course, the student will be able to:

1. Identify resistors, capacitors, inductors and transformer based on their construction, types and ratings and analyze simple circuits consisting of passive devices
2. Select power sources based on ratings and requirements
3. Identify active devices based on their types and ratings and plot their characteristic curves
4. Analyze basic circuits like rectifiers, BJT voltage amplifiers, switches and MOSFET switches
5. Use optoelectronic devices for various applications
6. Use the concepts of grounding and shielding, explain the PCB design and fabrication and assembly process and use EDA tools for designing single sided PCB for simple circuits

Unit 1: Passive Electronic Components **(04 Hours)**

- Introduction to the concept of active and passive electronic devices
- Types of resistors, construction, ratings and typical applications
- Types of capacitors, construction, ratings and typical applications
- Types of inductors, construction, ratings and typical applications

- Types of transformers, construction, ratings and typical applications
- Construction of relays, types and ratings
- Analysis of series and parallel resistors and capacitor circuits

Unit 2: Power Sources **(04 Hours)**

- Electrical power sources
- Types of voltage and current sources (AC and DC)
- Regulation
- Electrochemical cells and batteries
- Characteristics of various types of cells
- Applications

Unit 3: Active Electronic Devices **(08 Hours)**

- Classification of material based on band gap theory
- Types of semiconductors (p-type and n-type)
- pn junction diode and its characteristics
- Concept of DC and AC load line and ratings of pn junction diode
- Introduction to BJT (npn and pnp) and its construction and working mechanism
- BJT configurations and their input and output characteristics
- Types and ratings of BJT
- Construction and working of EMOSFET
- Characteristics of DMOSFET and EMOSFET
- Configurations and ratings of EMOSFET
- Introduction to OPAMP

Unit 4: Electronic Circuits **(08 Hours)**

- Basic diode circuits. Rectifiers
- Biasing circuits for BJT and MOSFET
- BJT and MOSFET as switches, relay and motor drivers
- Voltage and current amplifiers using BJT and MOSFET
- Basic OPAMP Circuits
- IC 555

Unit 5: Optoelectronic Devices **(06 Hours)**

- Construction and working of LDR and its characteristics, simple application
- Construction and working of LED and its characteristics and ratings
- Photo-transistor and its characteristics
- Introduction to the concept of electrical isolation and its importance
- Construction of opto-isolator(opto-coupler) and its ratings
- Construction and working of photovoltaic cell and its characteristics and ratings

Unit 6: Printed Circuit Boards **(06 Hours)**

- Concepts of grounding and shielding and its importance
- Building blocks of PCB (track, pads, fills) and design rules
- PCB fabrication and assembly
- Introduction to EDA tool for artwork design of a simple single sided PCB

List of Experiments:

1. Study of Lab Equipments (Power supply,Multimeter Function generator& DSO)
2. Study of Passive devices (Resistors,Capacitors,Inductors,Transformers & Relays)
3. To plot regulation characteristics of Power supply (Full wave rectifier output voltage Vs Load Current)
4. To plot characteristics of PN junction diode.
5. To plot input output characteristics of BJT (Common Emitter configuration)
6. To plot input output characteristics of BJT (Common Collector configuration)
7. To plot input output characteristics of BJT (Common Base configuration)
8. To plot Transfer characteristics & output characteristics of Inverting amplifier Non-inverting amplifier & Voltage follower
9. To plot Transfer characteristics & output characteristics of N-channel EMOS FET (To estimate GM & RD)
10. To plot LDR characteristics.
11. To plot characteristics of Optoisolator.
12. To plot characteristics of Photovoltaic cell.
13. Artwork design for single sided PCB using appropriate EDA tool design

Reference Books:

1. Passive Components for Circuit Design, Ian Sinclair,1st Edition 2000, ISBN: 9780750649339, Newnes
2. Grob's Basic Electronics, Mitchel Schultz,11th Edition,2010, ISBN-13: 978-0-07-351085-9,McGraw Hill
3. Fundamentals of Electronic Devices and Circuits, David A. Bell, 5th Edition,2008,ISBN:0195425235, 9780195425239,Oxford University Press,
4. Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015, ISBN 978–0–19–933913–6,Oxford University Press
5. Linden's Handbook of Batteries, Thomas Reddy,4th Editiion,2010, ISBN: 978-0-07-162419-0, McGraw Hill
6. Printed circuit boards: design, fabrication, assembly and testing,Raghbir Singh Khandpur,2006, ISBN 10:0071464204,McGraw Hill
7. The Circuit Designer's Companion, Peter Wilson, 4th Edition,2017, ISBN: 978-0-08-101764-7, Newnes

B. Tech (Robotics & Automation)
ENGINEERING CHEMISTRY

Designation of Course	**Engineering Chemistry**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 3 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Practical: 01
Practical : 02 Hours/ Week	Internal Assessment	40 Marks	
	Term Work	25 Marks	
	Oral/Practical Examination	-- Marks	
	Total	125 Marks	4
Course Prerequisites:-	Student should have Basic Knowledge of Chemistry		
Course Objective	1. To understand technology involved in analysis and improving quality of water as commodity. 2. To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials. 3. To understand structure, properties and applications of speciality polymers and nano material. 4. To study conventional and alternative fuels with respect to their properties and applications. 5. To study spectroscopic techniques for chemical analysis. **6.** To understand corrosion mechanisms and preventive methods for corrosion control.		
Course Outcomes:-	On completion of the course, learner will be able to– CO1: Select appropriate method of crystal analysis. CO2: Illustrate the knowledge of polymers, fabrication methods, conducting polymers in industrial fields. CO3: Illustrate the knowledge of engineering materials for various engineering applications. CO4: Analyze fuel with calorific value and apply combustion methods for use of alternative fuels. CO5: Explain corrosion and methods for prevention of corrosion. CO6: Apply the different methodologies for analysis of water and suggest suitable methods of treatment.		

Course Contents

Unit 1	**Material Chemistry**	**(8Hrs.)**

Crystallography: Unit cell, Law of crystallography, Weiss indices and Miller indices, Crystal defects(point and line defects), X-ray diffraction- Bragg's Law and numerical, Indexing of planes and directions,Imperfections in crystals, Density calculations, Volume density, Linear density, Atomic packing factor single crystal structure.

Unit 2	**Study of Polymers, Composite and ceramics Materials**	**(8Hrs.)**

A) Polymers: Introduction, plastics, thermo softening and thermosetting plastics, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, Conducting polymers and Biopolymers (Introduction, examples and applications.)

B)Composite: Introduction, Classification, constituents of composites, Fiber reinforced composites, unidirectional fiber reinforced composites, short fiber reinforced composites, particle reinforced composites, important types and failures of fiber reinforced composites, Advantages and applications of composites.

C) Ceramics: Introduction,classification, properties, ceramics crystal, Mechanical behaviour of Ceramics.

Unit 3	**Study of Non Ferrous Materials**	**(8Hrs.)**

Introduction, Copper and it's alloy, Alpha and alpha beta brasses, Zinc Equivalent, Copper Nickel alloy, Bronzes, Aluminium and it's alloy, Dispersion strengthening, Nickel and it's alloy, Metals at High and Low Temperature, Bearing Materials etc

Unit 4	**Fuels and Combustion**	**(8Hrs.)**

Definition, classification, characteristics of a good fuel, units of heat (no conversions).
Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numerical for calculations of Gross and Netcalorific values.
Solid fuels- Analysis of coal- Proximate and Ultimate Analysis- numerical problems and significance.
Liquid fuels- Petrol- Knocking, Octane number, Cetane number, Antiknocking agents, unleaded petrol, oxygenates (MTBE), catalytic converter.
Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.

Unit 5	**Corrosion and Prevention**	**(8Hrs.)**

Introduction, Types of corrosion, Oxide film growth laws, Action of hydrogen, Polarization, Stress corrosion, Season Cracking, Prevention of corrosion, Design of component, Modification of environment, Cathodic Protection, Deposition and coating, Ion Implantation, PVD, CVD, Powder coating etc.

Unit 6	**Water Technology and Green Chemistry**	**(8Hrs.)**

Water Technology -Impurities in water. Hardness of water and its determination by EDTA method, Alkalinity of water and its determination. Numerical. Ill effects of hard water in boiler. Boiler feed water treatment 1)Internal treatment -calgon, colloidal and phosphate conditioning, 2)External treatment A) Zeolite process and its

numerical (B) Ion exchanger method. Desalination of brackish water/purification of water by reverse osmosis and electrodialysis.

Green Chemistry: Definition, goals of green chemistry, efficiency parameters, need of green chemistry.

Text Books/ Reference Books

1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2. Bhal & Tuli, Text book of Physical Chemistry (1995), S. Chand & Company, New Delhi.
3. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
4. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.

Reference books:

1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.
2. Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015.
3. WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.
4. Atkins, Physical chemistry.

Assignments:

One assignment on each unit.

List of Experiments: (Perform any 08 Experiments)

1.To determine hardness of water by EDTA method
2. To determine strength of strong acid using pH meter
3. Titration of a mixture of weak acid and strong base using conductometer
4. Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin
5. To determine molecular weight/radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement.
6. Preparation of biodiesel from oil.
7. Determination of Saponification value of an oil sample.
8. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method
9. To determine Surface Tension of given liquid by Stalagmometer
10. Study of corrosion of metals in medium of different pH.
11. To set up Daniel cell
12. To determine pH of soil
13. To determine Acidity of soil
14. Study of Bomb calorimeter for determination of calorific value.
15. Determination of calorific value of gas fuel by using Boy's gas calorimeter.
16.Determination of percentage of Ca in given cement sample

Electrical & Electronic Measurement techniques		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits : 04
Practical: 02	Continuous Assessment: 40 Marks	
	TW: 25 Marks	Credit: 01

Course Pre-requisites:	
The Students should have knowledge of	
1.	Basic electrical Engineering Parameters such as Voltage, current, Power, Energy, etc.

Course Objectives:	
	This course introduces knowledge about electrical and electronic measurements. The course is designed to learn different methods of measurements of various electrical parameters and also to learn the different physical parameters with the help of the various measurement techniques.

Course Outcomes: After learning this course students will be able to	
1	Describe the importance of measurement and identify various conventional meters.
2	Describe the digital measurement techniques.
3	Describe the construction, working principle of wattmeter and Energy meter and apply the knowledge to measure the power and energy.
4	Draw block diagram, state specifications, functions of various digital/automated meters, harmonic analyzer.
5	Observe the waveforms and measure the voltage, current, phase and frequency on CRO and to use DSO.
6	Measure the resistance, inductance and capacitance using various methods.

UNIT – I	**Fundamentals of measurements :**	**(08 Hours)**
	Introduction: Review of fundamental and derived units. SI units, significance of measurement, classification of instruments, mechanical, electrical, electronic instruments, Methods of Measurement, Direct Measurement, Indirect Measurement, ... Classification of Instruments Absolute and Secondary Instruments Analog Ammeters and Voltmeters : Classification of Instruments , Absolute **Instrume Electrostatic Instruments, Ohmmeters.**	
UNIT - II	**Digital Voltmeters and Ammeters**	**(08 Hours)**
	Introduction, Types of tools used in digital systems: crystal oscillator, counters, converters, voltage to frequency conversion and phase lock loop PLL. Digital Instruments: DC digital voltmeter – Schematic diagram, Auto ranging circuit, Polarity detection. Auto zeroing. AC digital voltmeter – Schematic diagram, Sample and hold, Recorder and display. DVM for very low amplitude signal. Measurement of current and resistance by digital millimeter. Complete circuit of Digital Multimeter (DMM).	
UNIT -	**Measurement of Power and Energy**	**(08 Hours)**
	Measurement of Power: Construction, working principle, torque equation, advantages/disadvantages, errors and their compensation of dynamometer type wattmeter, low power factor wattmeter, Active & reactive power measurement in three phase balanced & unbalanced system **Measurement of energy:** Energy Meters in AC circuits, Single Phase Induction Type Energy Meter - Construction, principle of operation, torque equation of induction type energy meter, errors and adjustments. Three phase three wires, and three phase four wire energy meter, Electronic energy meter	

UNIT -	**Electronic Devices and Signal Analyzer's**	**(08 Hours)**
	Electronic Voltmeters and their Advantages, Vacuum Tube Voltmeters, difference Amplifier Type Voltmeters, DC Voltmeters with direct Coupled Amplifier, Measurement of Power at Audio and Radio Frequencies. Concept of: Numeric meter & its types Measurement of power & energy by sampling technique automatic meter reading (AMR) and advanced metering infrastructure (AMI), Wave Analyzers and its applications. D.C. Potentiometer , Crompton's Potentiometer, Standard Cell Dial , True Zero Brooks Deflection Potentiometer, Voltage Ratio Box , A.C. Potentiometers Requirements of AC Potentiometer, Drysdale-Tinsley Polar type A.C. Potentiometer, Advantages and Disadvantages of AC Potentiometer, Application of AC Potentiometer.	
UNIT - V	**Cathode Ray Oscilloscope (CRO)**	**(08 Hours)**
	Introduction, Cathode Ray Tube (CRT), Electron Gun, Electrostatic focusing, deflection, effect of beam transit time and frequency limitations, defection plates, screen for CRT's, color CRT displays, time base generators, Oscilloscope amplifiers, Vertical input and sweep generator signal synchronization, attenuators, basic CRO circuits, observation of waveforms on CRO, measurements of voltage and current, measurement of phase and frequency, multi input oscilloscopes, sampling oscilloscopes. Comparison between digital and analog storage oscilloscopes, accessories of CRO. Digital Storage Oscilloscope – Principle of operation and waveform reconstruction.	
UNIT - VI	**Measurement of Electrical Parameters**	**(08 Hours)**
	Measurement of Resistance – Classification of resistances, Measurement of medium resistance – Ammeter-voltmeter method, Wheatstone bridge. Measurement of Low resistance – Kelvin Double bridge. Measurement of high resistance – difficulties, use of guard circuit, Methods: direct deflection, loss of charge, Megger. Measurement of earth resistance – Fall of potential method, earth tester. Localization of cable faults. **Measurement of Inductance and Capacitance** **AC Bridges:** Introduction, sources and detectors for ac bridge, general equation for bridge balance. General form of ac bridge. Measurement of Inductance: Maxwell's Inductance, Anderson's Bridge.. Measurement of Capacitance- Schering Bridge, High voltage Schering bridge.	

Term Work:

The term work shall consist of record of minimum eight experiments.

1. Measurement of Voltage, current and resistance using digital voltmeter and digital multimeter.
2. To measure power in three phases balanced load by one wattmeter method.
3. To measure power in three phase balanced/ unbalanced load by two wattmeter method.
4. To measure reactive power in three phase circuit by one wattmeter method.
5. To calibrate single phase energy meter at (i) unity power factor (ii) 0.5 lagging power factor (iii) 0.5 leading power factor (analog / Digital)
6. To study and analyze the various electrical parameters using Power Analyzer.
7. To study the observation of waveforms on CRO, measurements of voltage and current, measurement of phase and frequency using CRO.
8. Study of digital storage oscilloscope.
9. Measurement of resistance by Kelvin double bridge/ Wheatstone bridge/Ammeter-voltmeter method
10. To study Megger/Earth Tester
11. Measurement of capacitance and loss angle by Schering Bridge.
12. Measurement of inductance by Anderson's bridge/ Maxwell's Inductance Bridge.
13. Measurement of resistance, capacitance and inductance using LCR meter.

Text Books:

1. A Course in Electrical and Electronic measurements & Instrumentation – by A. K. Sawhney, Dhanpat Rai & Sons.
2. Electronic Instrumentation: H.S. Kalsi – THM, 2nd Edition 2004.
3. A Course in Electronic and Electronic measurements by J. B. Gupta, S. K. Kataria & Sons.

Reference Books:

1. Electrical Measurement & Measuring Instruments Fifth edition, by E. W. Golding & Widdies, A. H. Wheeler & Co. Ltd.
2. Electronic measurement and instrumentation by Dr. Rajendra Prasad, Khanna Publisher, New Delhi.
3. Introduction to Measurements and Instrumentation, Second Edition by Ghosh, PHI Publication.
4. Introduction to Measurements and Instrumentation by Anand .PHI Publication

FUNDAMENTALS OF DESIGN & MANUFACTURING ENGINEERING

Designation of Course	**Fundamentals of Design & Production Engineering**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03
Practical:- 02 Hours/ Week	Internal Assessment	40 Marks	
	Term Work	25 Marks	1.0
	~~Oral/Practical~~	--	--
	Total	125 Marks	--
Course Prerequisites:-	Students should have the basic knowledge of Physics at Higher Secondary School Certificate		
Course Objective	To develop understanding about thermal, fluid, design and manufacturing aspects in mechanical engineering		
Course Outcomes:-	1. Design and analyze mechanisms of machines 2. Analyze mechanical elements and compare their suitability for various applications 3. Illustrate metal working processes with sketches 4. Classify metals cutting machines and illustrate various operations		

Course Contents

Unit 1	**Mechanisms of Machines**	(06 Hrs.)
Kinematic link, Kinematic pair, Kinematic chain, mechanism of machines, structure, Degree of freedom of planar mechanism, Inversions of four bar chain, Inversions of Single and double slider crank chain, Geneva mechanism, Ratchet and Paul mechanism		
Unit 2	**Introduction to Machine Elements**	(06 Hrs.)
Types of Belts and belt drives, Chain drive, rope drive, Types of gears, Types of gear trains, Types of Couplings, types of friction clutch, Power transmission shafts, axles, keys, types of Keys, Sliding Contact and Rolling Contact Bearing, Bush and ball bearings, Types of brakes.		
Unit 3	**Introduction to Robotics**	(06 Hrs.)
History of robotics, Definition of Robotics and robot, Laws of robotics, Classification of robots, Application of robots. Robot anatomy terms such as Axis/axes, End effector, Degree of freedom, Degree of mobility, Kinematics, Joints, Work envelope, Pay load, Reach, speed, Acceleration, Accuracy, Precision, Repeatability, Mounting, Footprint, Cycle time. Components of robots such as Sensors, Power conversion unit, Actuators, Manipulators, Controllers, Base and User Interface. Future of robotics.		
Unit 4	**Introduction to Metal Forming Processes**	(06 Hrs.)

Introduction, Hot working, Cold working, Sheet metal forming, Sheet metal cutting, Forging, Open die forging, Closed die forging, Forging defects, Rolling, Ring Rolling, Cold Rolling, Rolling defects, Extrusion, Extrusion process, wire drawing, extrusion defects, deep drawing

Unit 5	**Introduction to Casting Processes**	(06 Hrs.)

Sand casting, Types of pattern, materials, pattern making allowances, Moulding sand- properties and testing, Hand and machine moulding, core making, melting and pouring. Introduction to Melting furnaces, Defects in casting. Die casting, low pressure permanent mould castings, hot and cold chamber processes, Centrifugal casting, Semi-centrifugal casting, Investment casting.

Unit 6	**Introduction to Welding Processes**	(06 Hrs.)

Classifications of welding process, Arc welding – theory SMAW, GTAW, GMAW, FCAW, Submerged arc welding stud welding. Resistance welding- Theory, spot, seam, projection welding processes. Gas welding. Friction welding, ultrasonic welding, thermit welding, electron beam and laser welding. Use of adhesives for joining process.

Term work shall consist of any Eight Experiments of the following list

1. Assembly and working of 4-bar, 6-bar, 8- bar planner mechanisms
2. Finding relation between input angle and output angle for various link lengths
3. Study of power transmitting elements coupling, gears and bearings
4. Study and demonstration of different types of clutches
5. Study and demonstration of operations on Centre lathe
6. Study and demonstration of operations on drilling machines
7. Demonstration of various metal forming processes
8. Demonstration of moulding processes
9. Demonstration of casting processes
10. Demonstration of welding techniques

Text Books/ Reference Books

1. Mechanisms and Machine Theory, Ambekar A.G., Prentice-Hall of India, Eastern Economy Edition (2007)
2. Theory of Machines, S.S. Ratan, Tata McGraw Hill, 4th Edition (2014).
3. Introduction to Robotics. S. K. Saha. McGraw Hill, 2nd Edition
4. A Textbook of Production engineering. P.C. Sharma, S. Chand Publication, New Delhi, 2nd edition, 8th Edition (2014).
5. A Textbook of Manufacturing Technology: Manufacturing Processes, R. K. Rajput, Laxmi Publications (P) Ltd, 2nd Edition 2015

Assignments: At least ONE assignment on each unit

Problem Solving with Simulation & Programming		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Practical: 04 Hours / Week	Term Work: 25 Marks Oral: 25marks	02 Credits
Course Prerequisites:		
The students should have knowledge of Basic mathematics, computer operation and basic electrical engineering		
Course Objectives		
The course introduces fundamental concepts of simulation and programming for problem solving to all first year engineering students.		
Course Outcomes		
1.	To Understand and apply knowledge of basic concepts of problem solving.	
2.	To Understand and apply knowledge of Simulation.	
3.	To Describe Simulation Languages and softwares	
4.	To Describe and apply fundamental concepts of MATLAB programming	
5.	To Describe and apply fundamental concepts of MATLAB Simulink.	
6.	MATLAB Basic electrical engineering applications	
7.	MATLAB Simulink applications in Power electronics	
8.	To make awareness of Industrial applications of simulation softwares and MATLAB for electrical engineers.	
Unit-I	**Problem Solving:**	(6 hours)
	What is problem solving (definition and meaning) and why is it important, defining the problem, understanding complexity of problem solving, problem-solving processes (basic steps of the problem-solving process), types of problems, problem solving methods, Problem solving and decision making (solving problems and making decisions), problem solving examples. **Introduction to computer Problem Solving:** Introduction, the problem solving aspect, top down design, implementation of algorithm, program verification, the efficiency of algorithms, the analysis of algorithms.	
Unit-II	**Introduction to Simulation:**	(6 hours)
	What is simulation: Modeling basics, computer simulation (Popularity and advantages, different kinds of simulation), How simulation gets done (by hand, programming in general languages, simulation languages, high level simulators, Uses of simulations (past , present, future). **Fundamentals of simulation:** Steps in simulation study, phases of simulation study, advantages of simulation, limitations of simulation techniques, areas of applications, Monte Carlo Method, Examples on Monte Carlo Method.	
Unit-III	**Simulation Languages and softwares:**	(6 hours)
	Simulation Languages: Introduction, merits of simulation languages, simulation languages and simulators, desirable features of simulation software, discrete event simulation tools, classification of simulation tools, SIMSCRIPT, simulation language for alternative modeling(SLAMII), Simulation analysis(SIMAN), General purpose simulation system(GPSS), Simulation examples **Software's:** Description of P-Spice, Types of analysis, Description of simulation software tools (like OrCAD / PROTEL / Proteus / Microcap) Schematic Description: Introduction,	

	Input files, element values, Nodes, circuit elements, sources, output variables, format of circuit and output files, drawing the schematic, Design rule Check (DRC), Netlist details.	
Unit-IV	**Introduction to MATLAB programming** (theory & MATLAB examples)**:**	(6 hours)
	Introduction, starting and ending a MATLAB session, Fundamentals of MATLAB programming (MATLAB variables, arrays, matrices, MATLAB operators- arithmetic, relational, logical, MATLAB graphics(plots, subplots, other types of plots), benchmarking and looping functions(branching functions, looping functions), miscellaneous functions(string function, input/output function), examples on above topics, advantages of MATLAB, disadvantages of MATLAB, various MATLAB commands & their explanation.	
Unit-V	**Introduction to MATLAB Simulink** (theory & MATLAB examples)**:**	(6 hours)
	Introduction, simulation steps, types of mathematical model, developing a model, getting simulink (creating a new model/opening an existing simulink model), creating and simulating a simulink model, simulink solution of differential equation, solvers, keystrokes or mouse actions for handling blocks and lines, assigning variables, observing variables during simulation, storing saving data, linking script file/M-file with model file, data import/export, creating and masking subsystems, solution using laplace approach, simulation of non-linear system, equivalent circuit.	
Unit-VI	**MATLAB Basic electrical engineering applications:** (theory & MATLAB examples on each applications)	(6 hours)
	Basic electrical engineering applications(introduction, elementary definitions, basic waveforms, average value -RMS value -peak value, ohms law, Kirchhoff's laws, independent and dependent Dc sources, series and parallel circuits, resonance phenomenon, network theorems, apparent power-active power-reactive power, three phase source and load simulation, transformers.	
Unit-VII	**MATLAB Simulink applications in Power electronics** (theory & MATLAB examples on each applications):	(6 hours)
	Introduction, simpower systems toolbox (exploring simpower systems libraries, simpower systems libraries), building and simulating a simple circuit(study of voltage and current relationship in a series RLC circuit, study of resonance in a series RLC circuit), interfacing the electrical circuit with simulink(electrical terminal ports and simulink ports), diode circuits and rectifiers (simulation of single phase half wave rectifier, simulation of single phase full wave rectifier, use of freewheeling diode)	
Unit-VIII	**Industrial applications**	(6 hours)
	General applications of simulink and MATLAB in various industries.	
Termwork:		
	The term work shall consist of record of minimum sixteen experiments. **List of experiments:** 1. Schematic drawing & component symbol creation 2. Hierarchical schematic drawing **Simulation Experiments** 3. Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of :RLC Circuit Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of : Transistorized Circuit Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of : Two Stage Amplifier Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep,	

	parametric) of : IC Based Circuits 4. Experiments based on noise analysis and Monte-Carlo analysis 5. To simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing xy and x!. 6. To accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number e) prime factors 7. To accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers. 8. To accept a number from user and print digits of number in a reverse order. 9. To input binary number from user and convert it into decimal number. 10. 14. To calculate steady state error for different inputs and different types of system(MATLAB) **MATLAB Experiments** 11. Listing of some common MATLAB commands and executing these commands with examples 12. Experiment on Introduction to MATLAB programming: 13. Experiment on MATLAB Basic electrical engineering applications/ Solving network theorems using MATLAB 14. Experiment on MATLAB Simulink applications in Power electronics **Proteus Experiments** **15.** Design of a Regulated Power Supply **16.** Design of LED blinking system	
	Text books:	
	1. **How to solve it by computer** by RG Dromey(eastern economy editions) 2. **Simulation** with Arena by W.David Kelton, randall P. Sadowski, nancy B. Swets(Mc Graw Hill international edition). (unit 1 & 2) 3. **System Simulation** by D.S.Hira (S. Chand & Company Pvt Ltd.) 4. **MATLAB and SIMULINK** for engineers by Agam Kumar Tyagi (Oxford University Press). 5. **MATLAB and its Applications** in Engineering by Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma (Pearson India Education Services Pvt Ltd.) 6. Introduction to **MATLAB programming** toolbox and sumulink by Jaydeep Chakravorthy (University Press India Private Limited) 7. M. H. Rashid 'Introduction to P-spice using OrCAD for circuits and Electronics' – Pearson Education	
	Reference Books:	
	1. User manuals of PROTEL, PROTEUS, OrCAD, Microcap 2. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978- 0132492645	
	Assignments:	
	Assignments should be able to verify course outcome and skills of group work, communication skills. Two assignment on each unit (total 16 assignments)	

Soft Skills
(All branches) Sem-II

Designation of Course	**Soft Skills**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 2 Hours/ Week	End Semester Examination	50 Marks	Theory: 02 Tutorial: 00 Practical: 00
Tutorial : 00 Hours/ Week	Internal Assessment	00 Marks	
	Term Work	- Marks	
	Oral/Practical Examination	-- Marks	
	Total	50 Marks	2
Course Prerequisites:-	Students should have knowledge of basic soft skills Students should have basic information of self analysis techniques Basics of business manners		
Course Objective	The course objective of Soft skills puts the following class teaching objectives, considering soft skills as a wheel rolling aspects in today's world, the focus is on honing the skills self awareness and self development. It also puts emphasis on developing the interpersonal skills. Honing the skills of time management and stress management among students through appropriate activities, this will help them in their business ventures. It also aims to develop the skills of conflict resolution, problem solving and inclusion ability at work place.		
Course Outcomes:-	Graduates will able to **01.** To understand the concept of soft skills and its implication at workplace **02.** To analyze SWOT and TOWS techniques and its implementation in career development **03.** To develop team building and leadership skills by applying motivational factors **04.** To build up the time management mastery through Pareto Principles and time matrix **05.** To inculcate appropriate business ethics and etiquettes for effective professionalism **06.** To apply the negotiation, conflict resolution and problem solving skills at workplace		

Course Contents

Unit 1	Introduction	**(4 Hrs.)**
ft skills, meaning, need and importance, difference between soft skills and hard skills, life skills and personal skills, applying soft skills across culture		
Unit 2	Self awareness and self development:	**(4Hrs.)**
Self assessment, self appraisal through SWOT and TOWS, developing perception and attitude, personal goal setting and self management, Career planning and personal success factors		
Unit 3	Developing interpersonal skills:	**(4Hrs.)**
uational conversation, building team, team dynamics, developing leadership skills, difference between leader and manager, role and responsibilities of leader, different styles of leadership, Maslow's theory of motivation		
Unit 4	Time management:	**(4Hrs.)**
Time management matrix, apply Pareto principle (80/20) to the time management, handle the most common time		

wasters, maximizing personal effectiveness		
Unit 5	Business ethics and corporate etiquettes:	**(4Hrs.)**
hics- its definition, importance and code of ethics, workplace etiquettes and professionalism, communication etiquettes, telephonic etiquettes, meeting etiquettes		
Unit 6	oblem solving, Diversity and inclusion:	**(4Hrs.)**
nflict resolution, negotiation and problem solving, handling different problems at workplace, Diversity and inclusion at workplace, LGBTQ+, its advantages and disadvantages		

Reference Books:

01. Soft Skills by Meenkashi Raman, published by Cengage publishers
02. Soft skills for Managers by Dr. T. Kalyana Chakravarthi and Dr. T. Latha Chakravarthi published by biztantra
03. Personality development and Soft Skills by Barun K. Mitra by Oxford University press
04. Soft Skills by Dr. K Alex published by Oxford University press
05. The Ace of Soft Skills: Attitude, Communication and Etiquettes for Success by Ramesh Gopalswamy, published by pearson education
06. Seven Habits of Highly effective People: Powerful lessons in personal life by Stephen Covey

Recommended web-links for enhancing English language and business communication

01 http://www.englishlearner.com/tests/test.html
02. http://www.youtube.com/playlist?list=PLY3DFj1jjj0URoyHOnxuau610EgzOtoHI

Assignments:
At least ONE assignment on each unit

Production Practice

TEACHING SCHEME: EXAMINATION SCHEME: CREDITS ALLOTTED:

Practical: --2 Hrs/Week TW : 25 Marks 01 Credits

Pre-requisites: Basics of Manufacturing processes ,work shop tools , equipment's used in workshops.

Course Outcomes:

· Understand modern manufacturing operations, including their capabilities, limitations.

· Learn how to analyze products and be able to improve their manufacturability and make the cost effectively

· To acquire practical skills in the trades.

· To provides the knowledge of job materials in various shops.

Course Objectives

Student Should be able to,

1) Get the idea about Plastic Formation and sheet metal work

2) Understand the various machining operations on lathe

3) Understand the processes of casting.

4) Understand the techniques of TIG, MIG and spot Welding.

Four Sections

Section 1 – Plastic Moulding And Pattern Making job (Three Practical's For Individual Job Making)

Study of tools & operations like plastic moiding , Pattern making, Mould making with the use of a core.

Section 2 – Machining Processes (4 Practicals For Individual Job Making On Lathe Machine)

Study of tools & operations, Simple exercises involving turning on lathe work, Make perfect male-female joint, Simple exercises involving drilling/tapping/threading.

Section 3 –Casting And Sand Molding.(Two Practical's Casting Formation as a Batch Job)

Study of tools & operations like Pattern making, Mould making with the use of a core. Various Casting processes, Sand casting, Die casting.

Section 4 – Arc,TIG, MIG And Resistance Welding Processes (Three Practical's For Individual Job Making)

Study of tools & operations of Arc welding, Simple butt and Lap welded joints, Oxy-acetylene flame cutting, TIG, MIG And Resistance Welding Processes.