ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

B.E. MECHATRONICS ENGINEERING

REGULATIONS – 2017

CHOICE BASED CREDIT SYSTEM

1. PROGRAMME EDUCATIONAL OBJECTIVES:

Bachelor of Mechatronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

1. Develop innovative and sustainable products with multidisciplinary Engineering expertise.
2. Solve complex engineering problems by applying mechanical, electrical and computer knowledge and engage in lifelong learning in their profession
3. Work or pursue higher education in multicultural, multilingual and multinational environment with competent oral and written communication.
4. Lead and contribute in a team entrusted with professional, social and ethical responsibilities.

2. PROGRAMME OUTCOMES:

a. Will be able to apply the laws of science and mathematics to provide engineering solutions to solve complex problems.
b. Will be able to identify and analyze complex problems by modeling with the help of literature survey and validate the solution with experiments.
c. Will be able to design and develop Mechatronics systems by selecting and integrating, sensors, appropriate materials, mechanics, thermal systems, manufacturing and automation methods.
d. Will be able to collect, condition monitor and interpret data to provide engineering solutions.
e. Will be able to create applications, products as well as modernizing the existing systems by using latest tools and technologies.
f. Will be able to develop solutions for local and global requirements by applying engineering knowledge and professional ethics.
g. Will have professional values on environmental and energy consumption for sustainability.
h. Will be able to become a leader and contribute in a team with entrepreneurial qualities.
i. Will be able to interact effectively in both oral and written format.
j. Will continuously update their knowledge and skills to meet the ever changing global needs.

3. PEO / PO Mapping

PEO / PO	a	b	c	d	e	f	g	h	i	j
1	✓	✓	✓	✓	✓	✓	✓			
2	✓	✓	✓	✓	✓	✓				✓
3									✓	✓
4							✓	✓	✓	

ANNA UNIVERSITY, CHENNAI
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B.E. MECHATRONICS ENGINEERING
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I TO VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8251	Materials Science	BS	3	3	0	0	3
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

PROFESSIONAL ELECTIVES (PE)*

SEMESTER VI, ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IT8071	Digital Signal Processing	PE	3	3	0	0	3
2.	MT8001	Object Oriented Programming in C++	PE	3	3	0	0	3
3.	ME8091	Automobile Engineering	PE	3	3	0	0	3
4.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3
5.	GE8073	Fundamentals of Nano Science	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AN8091	Maintenance Engineering	PE	3	3	0	0	3
2.	ME8793	Process Planning and Cost Estimation	PE	3	3	0	0	3
3.	MG8491	Operations Research	PE	3	3	0	0	3
4.	MT8002	Advanced Manufacturing Technology	PE	3	3	0	0	3
5.	AE8751	Avionics	PE	3	3	0	0	3
6.	MF8071	Additive Manufacturing	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8093	Digital Image Processing	PE	3	3	0	0	3
2.	MT8003	Medical Mechatronics	PE	3	3	0	0	3
3.	MT8071	Virtual Instrumentation	PE	3	3	0	0	3
4.	IT8075	Software Project Management	PE	3	3	0	0	3
5.	GE8072	Foundation skills in Integrated Product Development	PE	3	3	0	0	3
6.	GE8074	Human Rights	PE	3	3	0	0	3
7.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8691	Artificial Intelligence	PE	3	3	0	0	3
2.	MG8091	Entrepreneurship Development	PE	3	3	0	0	3
3.	RO8791	Modeling and Simulation	PE	3	3	0	0	3
4.	EE8091	Micro Electro Mechanical Systems	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8492	Database Management Systems	PE	3	3	0	0	3
2.	MG8892	Marketing Management	PE	3	3	0	0	3
3.	IM8071	Product Design and Development	PE	3	3	0	0	3
4.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
2.	ME8682	Design and Fabrication Project	EEC	4	0	0	4	2
3.	HS8461	Reading and Writing Skills	EEC	2	0	0	2	1
4.	HS8581	Professional Communication	EEC	2	0	0	2	1
5.	MT8811	Project Work	EEC	20	0	0	20	10

SUMMARY

B.E. MECHATRONICS ENGINEERING											
	Subject Area	**Credits Per Semester**								**Credits Total**	**Percentage %**
	Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**		
1.	Humanities and Social Studies (HS)	4	7				3			14	8
2.	Basic Sciences (BS)	12	7	4	4					27	15
3.	Engineering Sciences (ES)	9	11	17		8				45	24
4.	Professional Core (PC)			3	18	11	16	13	3	64	34
5.	Professional Electives (PE)						3	6	6	15	8
6.	Open Electives (OE)					3		3		6	3
7.	Project Work (PR/EEC)			1	1	1	2		10	15	8
	TOTAL	**25**	**25**	**25**	**23**	**23**	**24**	**22**	**19**	**186**	
8.	**Non-Credit/ (Mandatory)**										

OUTCOMES:

Upon Completion of the course, the students will be able to:

CO1: Test and assess the performances of the DC motors and single phase AC motor for varying load.

CO2: Control the speed of AC and DC motor.

CO3: Analyze and present the findings of experimental observations in both written and oral format.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. NO	NAME OF THE EQUIPMENT	Qty
1	Shunt motor 5HP	3
2	Single phase Induction Motor 2HP	2
3	Three phase induction Motor 5HP	2
4	Single phase transformer 2KVA	1
5	Three phase auto transformer	2
6	Single phase auto transformer	2
7	3 point starter	3
8	DPST, TPST Each	2
9	DC source 300v, 100A	1
10	Ammeter(0-5A),(0-10A)MC Each	2
11	Ammeter(0-5A),(0-10A)MI Each	2
12	Voltmeter(0-300V) MC	3
13	Voltmeter(0-150V),(0-300V),(0-600V)MI Each	2
14	Wattmeter 150/300V, 5/10A UPF	2
15	Wattmeter 300/600V,5/10A UPF	2
16	Wattmeter 150/300V,5/10A LPF	2
17	Wattmeter 300/600V,5/10A LPF	2
18	Stepper motor 5Kg	1
19	Synchronous motor 5KW	1
20	Rheostat 360 ohm/1.2A	3
21	Tachometer	5
22	Rheostat 50 ohm/5A	3

HS8381 **INTERPERSONAL SKILLS/LISTENING & SPEAKING**

L	T	P	C
0	0	2	1

OBJECTIVES: The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- improve general and academic listening skills
- Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- Listen and respond appropriately.
- Participate in group discussions
- Make effective presentations
- Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

1. Brooks,Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES

1. Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014

TEXT BOOK:

1. Gopalakrishna K.R., “Machine Drawing”, 22nd Edition, Subhas Stores Books Corner, Bangalore, 2013

REFERENCES:

1. Junnarkar, N.D., “Machine Drawing”, 1st Edition, Pearson Education, 2004
2. N. D. Bhatt and V.M. Panchal, “Machine Drawing”, 48th Edition, Charotar Publishers,2013
3. N. Siddeshwar, P. Kanniah, V.V.S. Sastri, ”Machine Drawing” , published by Tata Mc GrawHill,2006
4. S. Trymbaka Murthy, “A Text Book of Computer Aided Machine Drawing”, CBS Publishers, New Delhi, 2007

HS8461	ADVANCED READING AND WRITING	L	T	P	C
		0	0	2	1

OBJECTIVES:

- Strengthen the reading skills of students of engineering.
- Enhance their writing skills with specific reference to technical writing.
- Develop students’ critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension-Read and recognize different text types-Predicting content using photos and title Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension Writing-State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples-Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-Writing- Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- Writing- Email writing- resumes – Job application- project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- Write different types of essays.
- Write winning job applications.
- Read and evaluate texts critically.
- Display critical thinking in various professional contexts.

TEXT BOOKS:

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011
2. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011

REFERENCES

1. Davis, Jason and Rhonda LIss.Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000
5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004

EE8552	POWER ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Different types of power semiconductor devices and their switching
- Operation, characteristics and performance parameters of controlled rectifiers
- Operation, switching techniques and basics topologies of DC-DC switching regulators.
- Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
- Operation of AC voltage controller and various configurations.

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulseconverters– performance parameters –Effect of source inductance— Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up chopper-control strategy– Introduction to types of choppers-A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.

HS8581	PROFESSIONAL COMMUNICATION	L	T	P	C
		0	0	2	1

OBJECTIVES: The course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates
- Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

Recommended Software

1. Globearena
2. Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

Software:		
1	Delta PLC software – free ware and corresponding PLC programming software.	1
2	Open source SCADA software such as Free SCADA, Open SCADA, Indigo SCADACodeSys Open source for PLC programming and interfacing with real time PLC.	1

ME8682 DESIGN AND FABRICATION PROJECT

L	T	P	C
0	0	4	2

OBJECTIVE:

- The main objective is to give an opportunity to the student to get hands on training in the fabrication of one or more components of a complete working model, which is designed by them.

GUIDELINE FOR REVIEW AND EVALUATION

The students may be grouped into 2 to 4 and work under a project supervisor. The device/ system/component(s) to be fabricated may be decided in consultation with the supervisor and if possible with an industry. A project report to be submitted by the group and the fabricated model, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL : 60 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 design and Fabricate the machine element or the mechanical product.

CO2 demonstrate the working model of the machine element or the mechanical product.

ME8691 COMPUTER AIDED DESIGN AND MANUFACTURING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide an overview of how computers are being used in mechanical component design
- To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION **9**

Product cycle- Design process- sequential and concurrent engineering- Computer aided design – CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations- homogeneous coordinates - Line drawing -Clipping- viewing transformation-Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM –CAD/CAM concepts —Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance

UNIT V CHASSIS AND SAFETY SYSTEMS 10

Traction control system – Cruise control system – electronic control of automatic transmission – antilock braking system – electronic suspension system – working of airbag and role of MEMS in airbag systems – centralized door locking system – climate control of cars.

TOTAL : 45 PERIODS

OUTCOMES:

After successful completion of this course, the students should be able to

CO1: Know the importance of emission standards in automobiles.
CO2: Understand the electronic fuel injection/ignition components and their function.
CO3: Choose and use sensors and equipment for measuring mechanical quantities, temperature and appropriate actuators.
CO4: Diagnose electronic engine control systems problems with appropriate diagnostic tools.
CO5: Analyses the chassis and vehicle safety system.

TEXT BOOK:

1. Ribbens, "Understanding Automotive Electronics", 8th Edition, Elsevier, Indian Reprint, 2013

REFERENCES

1. Barry Hollembeak, “Automotive Electricity, Electronics & Computer Controls”, Delmar Publishers, 2001.
2. Richard K. Dupuy “Fuel System and Emission controls”, Check Chart Publication, 2000.
3. Ronald. K. Jurgon, “Automotive Electronics Handbook”, McGraw-Hill, 1999.
4. Tom Denton, “Automobile Electrical and Electronics Systems”, Edward Arnold Publishers, 2000.

MT8811 PROJECT WORK

L	T	P	C
0	0	20	10

OBJECTIVES:

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Students in the form of group, not exceeding 3 members in a group to carry out their main project. It should be a Mechatronics project. However, special considerations can be given for interdisciplinary measurement and computer based simulation projects. This exception should be recorded and approved by the department committee. Management related projects will not be allowed. The interdisciplinary projects will carry more weight age. It is mandatory to publish their main project in national/international level conferences to appear in the viva-voce exam.

TOTAL: 300 PERIODS

OUTCOMES:

After successful completion of this course, the students should be able to

CO1: Design, analyze, realize / simulate a physical system by using the technology they learnt during the program.
CO2: Integrate various systems into one Mechatronics product.
CO3: Work in a team with confined time duration.
CO4: Disseminate his work both in oral and written format.

2009.
3. William F. Clocksin and Christopher S. Mellish," Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.
4. Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

MG8091 **ENTREPRENEURSHIP DEVELOPMENT** **L T P C**
3 0 0 3

OBJECTIVE:

- To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

UNIT I ENTREPRENEURSHIP **9**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION **9**

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS **9**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING **9**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS **9**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL: 45 PERIODS

OUTCOME:

- Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXT BOOKS :

1. Khanka S.S., "Entrepreneurial Development" S.Chand & Co. Ltd.,Ram Nagar, New Delhi, 2013.
2. Donald F Kuratko, " Entrepreneurship – Theory, Process and Practice", Cengage Learning 9th edition, 2014.

REFERENCES :
1. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers:
2. Entrepreneurship Development", Institute of India, Ahmadabad, 1986.
3. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
4. Mathew J Manimala, Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition, Dream Tech, 2005.
5. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.

RO8791 MODELING AND SIMULATION

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide an overview of how computers are being used in mechanical component design with the use of various CAD standards and to introduce the concepts of Mathematical Modelling of Engineering Problems using FEM with 2D scalar and vector variables problems respectively.

UNIT I MODELLING AND ASSEMBLEY **9**

Assembly modelling – interferences of positions and orientation – tolerance analysis-mass property calculations – mechanism simulation and interference checking

UNIT II CAD STANDARDS **9**

Standards for computer graphics- Graphical Kernel System (GKS) - standards for exchange images- Open Graphics Library (OpenGL) - Data exchange standards - IGES, STEP, CALS etc. - communication standards

UNIT III INTRODUCTION TO ANALYSIS **9**

Basic concepts of the Finite Element Method - Discretization -Meshing – Mesh refinement- Mesh Enrichment- Natural co-ordinate systems -Types of elements- Special Elements- Crack tip Element- Introduction to Analysis Software.

UNIT IV TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS **9**

Second Order 2D Equations involving Scalar Variable Functions – Variational formulation –Finite Element formulation – Triangular elements – Shape functions and element matrices and vectors. Application to Field Problems - Thermal problems.

UNIT V TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS **9**

Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.

TOTAL : 45 PERIODS

OUTCOMES:

CO1: To know the basic concepts of modelling and assembly for different mechanical components
CO2: To know the different types of CAD standards used in modeling of mechanical components
CO3: To know about basic concepts of FEA and analysis software for analyzing mechanical components
CO4: To know about different mathematical techniques used in finite element analysis to solve structural and thermal problems

TEXT BOOKS:

1. Ibrahim Zeid "Mastering CAD CAM" Tata McGraw-Hill Publishing Co.2007
2. Rao, S.S., "The Finite Element Method in Engineering", 5th Edition, Butterworth Heinemann, 2010

KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

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B.E-MECHATRONICS ENGINEERING

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

VISION:

To make the Department of Mechatronics Engineering the unique of its kind in the field of Research and Development towards Industrial Automation & Robotics.

MISSION:

To impart highly innovative and technical knowledge in Mechatronics Engineering to the urban and unreachable rural student folks through "Total Quality Education"

PROGRAM EDUCATION OBJECTIVES:

Educational objectives of the course Bachelor of Mechatronics Engineering programme can be divided into

PEO 1: Graduates will be able to apply their multi-disciplinary knowledge to formulate, design, develop and analyse Mechatronics Systems.

PEO 2: Graduates will be able to come up with solution for any real time problems in the field of Mechatronics Engineering and allied areas demanded by the Industry and Society.

PEO 3: Graduates will be able to get familiarized with economical issues in Mechatronics Engineering and work in multi-disciplinary teams with ethical code of conduct.

KAMARAJ COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

BE-MECHATRONICS ENGINEERING

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

SEMESTER III

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA1373	Transforms and Partial Differential Equations	BS	3	1	0	4	4
2	EC1371	Digital Electronics	PC	3	0	0	3	3
3	MT1301	Analog Devices and Circuits	PC	3	0	0	3	3
4	MT1302	Fluid Mechanics and Thermal Sciences	PC	3	0	0	3	3
5	MT1303	Solid Mechanics	PC	3	0	0	3	3
6	MT1306	Electrical Circuits and Machines	ES	3	0	0	3	3
PRACTICAL								
7	MT1311	Solid and Fluid Mechanics Laboratory	PC	0	0	4	4	2
8	MT1316	Electrical Circuits and Machines Laboratory	ES	0	0	4	4	2
9	HS1321	Interpersonal Skills-Listening and Speaking	EE	0	0	2	2	1
			TOTAL	**18**	**1**	**10**	**29**	**24**

Wattmeter 300/600V,5/10A UPF	2
Wattmeter 150/300V,5/10A LPF	2
Wattmeter 300/600V,5/10A LPF	2
Stepper motor 5Kg	1
Synchronous motor 5KW	1
Rheostat 360 ohm/1.2A	3
Tachometer	5
Rheostat 50 ohm/5A	3
Resistors & Breadboards	-
Dual Regulated power supplies	6
Ammeter A.C and D.C	20
Voltmeters A.C and D.C	20

HS1321 INTERPERSONAL SKILLS- LISTENING AND SPEAKING

L	T	P	C
0	0	2	1

OBJECTIVES

The course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- improve general and academic listening skills
- Make effective presentations.

Unit I LISTENING AS A KEY SKILL 6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics –– stressing syllables and speaking clearly – intonation patterns – conversation starters: small talk.

Unit II LISTEN TO A PROCESS INFORMATION 6

Listen to a process information- give information, as part of a simple explanation –– taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to

producing fragmented utterances - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

Unit III LEXICAL CHUNKING 6

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer –accept – decline – take leave – listen for and follow the gist- listen for detail

Unit IV GROUP DISCUSSION 6

Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade- negotiate disagreement in group work.

Unit V GROUP & PAIR PRESENTATIONS 6

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

TOTAL: 30 PERIODS

COURSE OUTCOMES

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

CO1 Develop their communicative competence in English with specific reference to listening

CO2 Prepare conversation with reasonable accuracy

CO3 Apply lexical Chunking for accuracy in speaking

CO4 Demonstrate their ability to communicate effectively in GDs

CO5 Explain directions and instructions in academic and business contexts

TEXTBOOKS

1. Brooks, Margret,2011, *Skills for Success. Listening and Speaking. Level 4,* Oxford University Press, Oxford.
2. Richards, C, Jack& David Bholke,2010, *Speak Now Level 3,* Oxford University Press, Oxford.

REFERENCES

1. Bhatnagar, Nitin&MamtaBhatnagar,2010, *Communicative English for Engineers and Professionals,* Pearson, New Delhi.
2. Hughes, Glyn & Josephine Moate,2014, *Practical English Classroom,* Oxford University Press, Oxford.
3. Vargo, Mari,2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack,2006,*Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter,2014, *Role Play*. Oxford University Press, Oxford.

WEB RESOURCES

1. https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf
2. https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html
3. https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/
4. https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.html