Curriculum and Syllabus for B.Tech.

Smart Manufacturing

(From The Academic Year 2020)

Approved in Senate 43 & 44

Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram
Chennai-600 127

Semester 1								
S.No	Course Code	Course Name		Category	L	T	P	C
1	MA1000	Calculus		BSC	3	1	0	4
2	PH1000	Engineering Electromagnetics		BSC	3	0	0	3
3	EC1000	Electrical Circuits for Engineers		BEC	3	1	0	4
4	CS1000	Problem Solving and Programming		BEC	3	0	0	3
5	ME1000	Materials for Engineers		BEC	3	0	0	3
6	DS1000	Foundation for Engineering and Product Design		DSC	1	2	0	3
7	PH1001	Engineering Electromagnetics Practice		BSC	0	0	3	1.5
8	CS1001	Problem Solving and Programming Practice		BEC	0	0	3	1.5
9	HS1000	Effective Language and Communication Skills		HSC	1	0	2	2
10	NC1000	NSO Semester 1	Anyone	NC	0	0	2	0
	NC1002	NCC Semester 1						
	NC1004	SSG Semester 1						
								25
Semester 2								
S.No	Course Code	Course Name		Category	L	T	P	C
1	MA1001	Differential Equations		BSC	3	1	0	4
2		Science Elective Course 1		SEC	3	1	0	4
3	ME1001	Engineering Graphics		BEC	2	0	4	4
4	CS1002	Elementary Data Structures and Logical Thinking		ITC	3	0	0	3
5	DS1001	Sociology of Design		DSC	1	2	0	3
6	ID1000	Design and Manufacturing Lab		ITC	0	0	2	1
7	ME1002	Applied Mechanics		PCC	3	0	0	3
8	CS1003	Elementary Data Structures and Logical Thinking Practice		ITC	0	0	4	2
9	ME1003	Applied Mechanics Practice		PCC	0	0	2	1
10	NC1001	NSO Semester 2	Anyone	NC	0	0	2	0
	NC1003	NCC Semester 2						
	NC1005	SSG Semester 2						
11	NC1008	Earth, Environment and Design		NC	1	0	0	0
								25
Semester 3								
S.No	Course Code	Course Name		Category	L	T	P	C
1		Science Elective Course 2		SEC	3	1	0	4
2	DS2000	Systems Thinking for Design		DSC	1	2	0	3
3	ME2003	Manufacturing Processes - 1		PCC	3	1	0	4
4	ME2011	Theory of Machines and Design		PCC	3	0	0	3
5	EC2005	Electrical Drives		PCC	2	0	0	2
6	ME2012	Sensors and Controls		PCC	3	0	0	3
7	ME2004	Manufacturing Processes Practice - 1		PCC	0	0	3	1.5

8	CS2006	Introduction to Data Management	PCC	2	0	2	3
9	EC2006	Electrical Drives Practice	PCC	0	0	3	1.5
10	NC2000	Indian Constitution, Essence of Indian Traditional Knowledge	NC	1	0	0	0
							25

Semester 4							
S.No	Course Code	Course Name	Category	L	T	P	C
1		Science Elective Course 3	SEC	3	1	0	4
2	DS2001	Smart Product Design	DSC	1	2	0	3
3	ME2007	Manufacturing Processes - 2	PCC	3	1	0	4
4	ME2014	Thermal and Fluids Engineering	PCC	3	0	0	3
5	ME2015	Operations Research	PCC	3	0	0	3
6	ME2016	Production Drawing Practice	PCC	0	0	3	1.5
7	ME2010	Manufacturing Processes Practice - 2	PCC	0	0	3	1.5
8	EC2012	Embedded Systems Practice	PCC	1	0	2	2
9	CS2013	Machine to Machine Communication	PCC	2	0	2	3
10	NC2001	Human Values and Stress Management	NC	1	0	0	0
							25
Semester 5							
S.No	Course Code	Course Name	Category	L	T	P	C
1	CS3006	Introduction to Data Science for Engineers	ITC	3	0	2	4
2	DS3000	Entrepreneurship and Management Functions	DSC	1	2	0	3
3	ME3004	Operations and Supply Chain Management	PCC	3	0	0	3
4	ME3005	Robotics and Automation	PCC	3	0	0	3
5		Professional Elective Course 1	PEC	3	1	0	4
6	ME3006	Quality Engineering	PCC	2	0	2	3
7	ME3007	Robotics and Automation Practice	PCC	0	0	2	1
8	NC3000	Professional Ethics and Organizational Behaviour	NC	1	0	0	0
							21
Semester 6							
S.No	Course Code	Course Name	Category	L	T	P	C
1	DS3001	Prototyping and Testing	DSC	1	2	0	3
2		Professional Elective Course 2	PEC	3	1	0	4
3		Professional Elective Course 3	PEC	3	1	0	4
4		Free Elective Course 1	ELC	3	1	0	4
5		Free Elective Course 2	ELC	3	1	0	4
6	HS3000	Professional Communication	HSC	1	0	2	2
7	NC3001	Intellectual Property Rights	NC	1	0	0	0
							21
Semester 7							
S.No		Course Name	Category	L	T	P	C
1		Free Elective Course 3	ELC	3	1	0	4

2		Free Elective Course 4	ELC	3	1	0	4
3		Free Elective Course 5	ELC	3	1	0	4
4	ME4000	BT-SM-Summer Internship (May-Jul)	PCD	0	0	16	0
							12
Semester 8							
S.No	Course Code	Course Name	Category	L	T	P	C
1		Free Elective Course 6	ELC	3	1	0	4
2	ME4001	BT-SM-Project	PCD	0	0	16	8
							12

$ All NC courses are Pass/Fail courses for which the letter grade H/L shall be awarded.

1. Professional Elective Course is an elective course offered or prescribed by the parent department. A free Elective Course is an elective course offered by any department, including the parent department. For example: - a ME student, based on his/her choice, can register the elective course offered by the ME department or CSE department as a free elective course.
2. 3 Months internship is mandatory, however, the curriculum offers the flexibility to carry out 3-12 Months internship with the approval of the parent department. To satisfy the minimum credit requirement, students opting for long term internship (More than 3 months) are expected to advance a few elective courses and credit a few courses from NPTEL. In line with the guidelines approved by the Senate (Senate 46-07), a B.Tech student can earn a maximum of 9 credits from NPTEL Courses. For all successfully completed NPTEL Courses, the letter grade "H" (Pass) will be awarded and credits of such courses will not be accounted for CGPA calculation.

Semester wise Credit Distribution

Category	Semester									
	S1	S2	S3	S4	S5	S6	S7	S8	Total	%
Basic Science Course (BSC)	8.5	4	0	0	0	0	0	0	12.5	7.5
Science Elective Course (SEC)	0	4	4	4	0	0	0	0	12	7.2
Basic Engineering Course (BEC)	11.5	4	0	0	0	0	0	0	15.5	9.3
Design Course (DSC)	3	3	3	3	3	3	0	0	18	10.8
IT Skill Course (ITC)	0	6	0	0	4	0	0	0	10	6.0
Professional Core Course (PCC)	0	4	18	18	10	0	0	0	50	30.1
Professional Elective Course (PEC)	0	0	0	0	4	8	0	0	12	7.2
Elective Course (ELC)	0	0	0	0	0	8	12	4	24	14.5
Humanities and Social Science Course (HSC)	2	0	0	0	0	2	0	0	4	2.4
Professional Career Development (PCD)	0	0	0	0	0	0	0	8	8	4.8
Total	25.0	25.0	25.0	25.0	21.0	21.0	12.0	12.0	166.0	100.0
	25.0	50.0	75.0	99.0	121.0	142.0	154.0	166.0		

Course Name	Calculus	Course Code	MA1000			
Offered by Department	SH -Mathematics	Structure (LTPC)	3	1	0	4
To be offered for	B.Tech	Course type	Core			
Pre-requisite	NIL	Approved In	Senate-43			
Learning Objectives	The course will introduce the student to basic concepts in Calculus such as convergence, differentiation & integration and its applications.					
Contents of the course	• Limit and Continuity of functions defined on intervals, Intermediate Value Theorem, Differentiability, Rolle's Theorem, Mean Value Theorem, Taylor's Formula (5) • Sequences and series (7) • Definite integral as the limit of sum – Mean value theorem – Fundamental theorem of integral calculus and its applications (9) • Functions of several variables – Limit and Continuity, Geometric representation of partial and total increments Partial derivatives – Derivatives of composite functions (8) • Directional derivatives – Gradient, Lagrange multipliers – Optimization problems (7) • Multiple integrals – Evaluation of line and surface integrals (6)					
Essential Reading	1. Thomas. G.B, and Finney R.L, Calculus, Pearson Education, 2007.					
Supplementary Reading	1. Piskunov. N, Differential and Integral Calculus, Vol. I & II, Mir. Publishers, 1981. 2. Kreyszig. E, Advanced Engineering Mathematics, Wiley Eastern 2007. 3. J Hass, M D Weir, F R Giordano, Thomas Calculus, 11th Edition, Pearson.					

Course Name	Engineering Electromagnetics	Course Code	PH1000			
Offered by Department	SH -Physics	Structure(LTPC)	3	0	0	3
To be offered for	B. Tech	Course Type	Core			
Pre-requisite	NIL	Approved In	Senate-43			
Learning Objectives	The objective of this course is to give an idea how the electromagnetic wave behaves. This also provides an understanding of theories of electrostatics, magnetism and electrodynamics with their applications. It will enhance the problem solving capacity of the student.					
Contents of the course	• Vectors - an introduction; Unit vectors in spherical and cylindrical polarco-ordinates; Concept of vector fields; Gradient of a scalar field; flux, divergence of a vector, Gauss's theorem, Continuity equation; Curl–rotational and irrational vector fields, Stoke's theorem. (12) • Electrostatics: • Electrostatic potential and field due to discrete and continuous charge distributions, boundary condition, Energy for a charge distribution, Conductors and capacitors, Laplace's equation Image problem, Dielectric polarization, electric displacement vector, dielectric susceptibility, energy in di-electric systems. (10) • Magneto statics: • Lorentz Force Law Bio-Savart's law and Ampere's law in magneto statics, Divergence and curl of B, Magnetic induction due to configurations of current-carrying conductors, Magnetization and bound currents, Energy density in a magnetic field Magnetic permeability and susceptibility. (10) • Electrodynamics: • Electro motive force Time-varying fields, Faraday's law of electro-magnetic induction, • Self and mutual inductance, displacement current, Maxwell's equations in free space. Boundary condition, propagation in linear medium. Plane electro-magnetic waves—reflection and refraction, electromagnetic energy density, Pointing Vector.(10)					
Essential Reading	1. W.H.Hayt, and J.A.Buck, Engineering Electromagnetics, Tata McGraw Hill Education Pvt. Ltd, 2006.					
Supplementary Reading	1. W. H. Hayt, J. A.Buck and M.Jaleel Akhtar, Engineering Electromagnetics, McGraw Hill (India) Education Pvt. Ltd, Special Indian Edition 2020. 2. Purcell. E.M, Electricity and Magnetism Berkley Physics Course, V2, Tata McGraw Hill, 2008. 3. Feynman.R.P, Leighton.R.B, Sands.M, The Feynman Lectureson Physics, Narosa Publishing House, Vol. II, 2008. Hill, 2008. 4. G.B.Arfken, H.J.Weber and F.E.Harris, Mathematical Methods for Physicists, Academic Press, 2013					

Course Name	Electrical Circuits for Engineers	Course Code	EC1000			
Offered by Department	Electronics and Communication Engineering	Structure(LTPC)	3	1	0	4
To be offered for	B.Tech	B. Tech	Core			
Pre-requisite	NIL	Approved In	Senate-43			
Learning Objectives	This course aims to equip the students with a basic understanding of electrical circuits and machines for specific types of applications. This course also equips students with an ability to understand basics of analog and digital electronics.					
Learning Outcomes	The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, and electronic devices and circuits and be able to apply them in product design and development					
Contents of the course *(With approximate break-up of hours)*	Elements in electrical circuits: R, L, C, voltage and current sources, Ohm's law, Kirchoff's Laws **(4)** Network analysis: Nodal and mesh analysis with only independent sources **(4)** Network theorems: Super position, The venin's & Norton's, Maximum power transfer theorems **(4)** DC circuits: Response of RC, RL and RLC circuits **(6)** AC circuits: AC signal measures, Phasor analysis of single-phase AC circuits, Three phase AC circuits **(6)** Machines: Transformers, DC generator, DC motor, AC induction machines **(8)** Diodes: V-I characteristics, applications- rectifiers, clippers, clampers **(2)** Op-amps: gain, feedback, applications-inverting/non-inverting amplifiers, sum and difference amplifier, comparators **(4)** Logic gates and combinational circuits– Basic gates, Karnaugh maps, Full adder, half adder **(4)**					
Essential Reading	1. Edward Hughes, Ian Mc Kenzie Smith, John Hiley, Keith Brown, 'Hughe's Electrical and Electronic Technology', 10th edition, Pearson,2010					
Supplementary Reading	1. Charles Alexander and Matthew Sadiku 'Fundamentals of Electric Circuits' 7th Edition, McGrawHill,2021 2. C.H.Roth,Jr., Larry R Kinney, 'Fundamentals of Logic Design', 7th Edition, Cengage Learning, 2013. 3. Jacob Millman, Christos C Halkais, Satyabrata Jit, 'Millman's Electronic Devices and Circuits', 4th Edition, McGrawHillIndia, 2015 4. Stephen D Umans, 'Fitzgerald & Kingsley's Electric Machinery', McGraw-Hill, 7th ed. 2020.					

Course Name	Problem Solving and Programming	Course Code	CS1000			
Offered by Department	Computer Science	Structure (LTPC)	3	0	0	3
To be offered for	B.Tech	Course type	Core			
Prerequisite	NIL	Approved In	Senate -43			
Learning Objectives	Focus is on problem solving using computers with C programming as the language. Data representation, base conversions, arithmetic in fixed and floating point representations, and problems related to this shall be covered. The sequence, selection and repetition statements in C programming language shall be discussed with case studies. The practice component of this course shall supplement theory by providing hands-on experience.					
Learning Outcomes	The teaching and assessment shall ensure that given a computational problem, students can use computers as a tool to model and solve the problem. Writing pseudo codes and C programming using basic programming constructs are expected out of the students. Students are expected to be conversant in number conversions and representations.					
Course Contents (with approximate breakup of hours for lecture/tutorial/practice)	• Computing Machine - Need and Applications - Evolution of Computing Machines (Calculators through Computers) Number Representation - Fixed and Floating Point - Base Conversions: Binary, Decimal, Octal, Hexa decimal number systems and conversions. (8 hours) • Basic programming constructs in C – Data types in C – Input and output statements – Formatted input/output - Control strings - return types - Case studies involving sequence statements (4hours) • Operators - Arithmetic, logical, relational, shift, unary operators - Precedence and Associativity (3 hours) • Selection Statements: IF-ELSE, SWITCH-CASE - Programs involving sequence and selection - GOTO statements - break statement - Nested IF - Switch inside if and vice-versa (5 hours) • Repetition Statements: FOR, WHILE - Programs involving sequence, selection and repetition - continue statement - Nested loops (5 hours) • Introduction to Arrays and Strings - Array manipulation - string manipulation - string operations - multi-dimensional arrays (6 hours) • Functions in C – Function declaration, definition – scope -storage Class-Built and user defined functions –Recursive functions (7 hours) • Introduction to Pointers, Dynamic Memory Allocation, Structures and File processing (7 hours)					
Essential Reading	Deitel P J and Deitel H M, C : How To Program, Prentice Hall, 7th Edn, 2012.					
Supplementary Reading	Kernighan, Ritchie D, The C Programming Language, Prentice Hall, 2nd Edn, 1988					

Course Name	Materials for Engineers	Course Code	ME1000			
Offered by Department	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B. Tech	Course Type	Core			
Pre-requisite	NIL	Approved In	Senate- 43			
Learning Objectives	• To provide overview of microstructure and properties of various engineering materials • To explore relations between performance of engineering products and microstructure, properties of materials that are used to construct them.					
Learning Outcomes	After the completion of the course, students will be able: • To explain the microstructure and properties of materials like steels, polymers, ceramics, and composites. • To understand the correlation of microstructure-properties-performance of materials so as to select suitable materials for engineering products.					
Contents of the course	• Classification and evolution of engineering materials, crystal structure, defects, crystallographic planes, directions, slip, deformation mechanical behavior, strengthening mechanisms, microstructure and properties of metal alloys (12) • Properties and processing of polymers, ceramics and composite materials, microstructure-property relationships (9) • Electrical, electronic and magnetic properties of materials, microstructure-property relationships (6) • Introduction to Nano, Bio, Smart and Functional materials. (3) • Introduction to selection of materials, Product based case studies on microstructure-property-performance of materials in the design of automobile; aircraft structures; e-vehicles; energy storage; electronic, optical and magnetic devices; and biomedical devices. (12)					
Essential Reading	1. William D. Callister Jr., David G. Rethwisch, "Materials Science and Engineering: An Introduction", 10th Edition, Wiley, 2018. 2. Michael Ashby, Hugh Shercliff, David Cebon, "Materials – Engineering, Science, Processing and Design", 4th Edition, Butterworth-Heinemann, 2018.					
Supplementary Reading	1. V Raghavan, "Materials Science and Engineering: A First Course, 5th Ed, 2007, PHI India. 2. Donald R. Askeland K Balani, "The Science and Engineering of Materials," 7th Edition, Cengage Learning, 2016. 3. Michael Ashby, "Materials Selection in Mechanical Design", 5th Edition, Butterwoth-Heinemann, 2016.					

Course Name	Foundation for Engineering and Product Design	Course Code	DS1000			
Offered by Department	SIDI	Structure (LTPC)	1	2	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate -43			
Learning Objectives	The objective of this foundation program is to help students coming from +2 background to: • Unlearn limiting assumptions, risk avoidance, fear of failure • Awaken their senses & rediscover their creative selves • Experience the impact of design and technology in everyday objects					
Learning Outcomes	At the end the course, the student should • demonstrate qualities of immersion in a task; • unlearn key limiting assumptions; • become comfortable with sketch-thinking and develop skills in design sketching; • be excited by the potential of technology and design in improving lives;					
Contents of the course(With approximate break up of hours)	**Module-1: Induction: (5 hrs.)** • History of the place; the industrial ecosystem; institution • Exercises to improve interaction; local visits; **Module-2: Learn to observe nature and self (12 hrs)** • Know your context - physical and social; • Unlearning activities; Start journaling • Observe wholes-parts (trees-leaves); variety of leaves; colors • Document in a variety of ways - collage; sketch, paint, photograph, video **Module-3: Learn to observe everyday objects (15 hrs)** • Unbundle everyday objects, observe, reorganize • Whole-part relations; System physics; • Observe interplay of art, design, culture, technology in everyday objects **Module-4: Visualize and Realize 3D objects (15 hrs)** • Introduction to design sketching-1 (paper/pencil) • Concepts of perspective drawing and product sketching. • Introduction to color theory - mixing of colors to get different shades • Explore variations on the form of chosen objects • Realize designs with tools/materials (Origami; Clay; Foam cutting; Laser cutting; Glues) • Introduction to digital sketching & 3D printing Evaluation: Continuous assessment (80%); Final Form Designs Presentation (20%)					
Essential &Supplementary Reading	1. Kevin Henry, Drawing for Product Designers, Laurence King Publishing, 2012, ISBN:9781856697439 2. Koos Eissen and Roselien Steur, Sketching – The Basics, BIS Publishers, 2011, ISBN:9789063695347 3. Thomas C Wang, Pencil Sketching, John Wiley, 2002, ISBN:9780471218050 4. Wucius Wong, Principles of Color Design: Designing with Electronic Color, John Wiley, 2nd Edition, 1996, ISBN:9780471287087					

Course Name	Engineering Electromagnetics Practice	Course Code	PH1001			
Offered by Department	SH-Physics	Structure(LTPC)	0	0	3	1.5
To be offered for	B.Tech	Course Type	Core			
Pre-requisite	NIL	Approved In	Senate-43			
Learning Objectives	The objective of this course is to give a hand on experience how the electromagnetic wave behaves in different situations. The students will be able to relate the knowledge they have got in the theory class with their experience. This course will enhance their skill of handling instruments and the presentation of the results obtained from the experiments.					
Contents of the course	Electrical and magnetic properties of materials based on the concept of electrical polarization, magnetization of materials will be studied in various experiments. Experiments based on the concept of phenomena such as interference, diffraction etc. related to electro-magnetic waves will be done here and these methods will be applied to measure some unknown physical quantities such as wavelength of a light, diameter of a very thin wire, very small aperture for light etc.					
Essential Reading	1.IIITD&M Laboratory manual for Electromagnetic Wave Practice					
Supplementary Reading	1. W.H.Hayt and J. A.Buck, Engineering Electro magnetics, Tata McFraw Hill Education Pvt. Ltd, 2006.					

Course Name	Problem Solving and Programming Practice	Course Code	CS1001			
Offered by Department	Computer Science	Structure (LTPC)	0	0	3	1.5
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-43			
Learning Objectives	Focus is on problem solving using computers with C programming as the language. The sequence, selection and repetition statements in C programming language shall be discussed with case studies.					
Learning Outcomes	The teaching and assessment shall ensure that given a computational problem, students can use computers as a tool to model and solve the problem. Writing pseudo codes and C programming using basic programming constructs are expected out of the students. Students are expected to be conversant in number conversions and representations.					
Course Contents (with approximate breakup of hours for lecture/tutorial/ practice)	• Introduction to text editors - basic text processing - case studies involving office software - doc and ppt creation • Introduction to Linux commands - file/directory creation - copy, move, pdf creation, zip commands • Case studies using sequence statements - input/output statements - arithmetic with precedence and associativity. • Case studies involving selection and repetition statements - functions – recursion					
Essential Reading	Deitel P J and Deitel H M, C : How To Program, Prentice Hall, 7th Edn, 2012.					
Supplementary Reading	Kernighan, Ritchie D, The C Programming Language, Prentice Hall, 2nd Edn., 1988					

Course Name	Effective Language and Communication Skills	Course Code	HS1000			
Offered by Department	SH-English	Structure (LTPC)	1	0	2	2
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-43			
Learning Objectives	• Hone LSRW and practice critical thinking • Enable students to speak and write grammatically acceptable sentences • Train students in technical communication • Cultivate interest to learn language and to build the confidence to communicate in English • Develop an interest in updating their language skills through continuous learning • Connecting personal growth with improvement in their proficiency in English					
Learning Outcomes	• Able to communicate effectively with grammatically acceptable constructions and appropriate words in formal and informal situations • Can extract information effectively and able to think critically • Able to present technical content confidently					
Course Contents (with approximate breakup of hours for lecture/ tutorial/ be done practice)	• Introduction: Language, effective communication, ethics and aesthetics of communication (L1) • Phonetics – sounds, pronunciation of words, stress, intonation, listening, Varieties of English (L3, P4) • Sentence structure, concord, punctuation, stylistic errors, common errors (L3, P4) • Reading and comprehension (L2, P5) ➢ Different types of reading, analyzing the organization of the text ➢ Critical thinking- thesis statement, argument, hypothesis, order, reason, evidence, consistency, tautology, conclusion • Exercises for vocabulary enrichment (for daily practice) • Speaking (L2, P5) ➢ Barriers to effective communication, technical presentation and presentation skills, self-introduction, ➢ Requests, enquiry, suggestion in formal and informal situations, reporting an event, group presentation – debate • Writing (L3, P8) ➢ Writing formal letters, email, résumé, ➢ Data interpretation, reports, product description/requirements/ technical instructions, recording observations ➢ The language of content strategy - voice and tone strategy - the language of localization – text analysis tools ➢ Plagiarism – the importance of documentation, different methods of note-taking ➢ Essays/story/ book & movie reviews/writing for social media/blogging/ journaling • Life lessons through stories and activities (P2)					
Essential & Supplementary Reading	1. Tebeaux, Elizabeth, and Sam Dragga. *The Essentials of Technical Communication*. OUP, 2018. 2. Rizvi, M Ashraf. *Effective Technical Communication*. McGraw-Hill, 2017 3. Hancock, Mark. *English Pronunciation in Use: Intermediate Self-study and Classroom Use*.CUP,2012. 4. Cottrell, Stella. *Critical Thinking Skills: Developing Effective Argument and Analysis*. Palgrave,2005. 5. Gower, Roger. *Grammar in Practice*. CUP, 2005. 6. Paterson, Ken. *Oxford Living Grammar*. OUP, 2014. 7. Sabin, William A. *The Gregg Reference Manual: A Manual of Style, Grammar, Usage, and Formatting*. McGraw-Hill, 2011. 8. Fitikides, T. J. *Common Mistakes in English*. London: Orient Longman, 1984.					

	Leech, Geoffrey and Jan Svartvik. A Communicative Grammar of English. Routledge, 2013. 9. Astley, Peter and Lewis Lansford. *Oxford English for Careers: Engineering*. OUP, 2013. 10. Savage, Alice and Patricia Mayer. *Effective Academic Writing*. OUP, 2013 11. Harari, Yuval Noah. *Sapiens: A Brief History of Humankind*. Vintage, 2014. 12. https://www.ted.com/ 13. https://www.bbc.co.uk/learningenglish/features/pronunciation/tims-pronunciation-workshop-ep-13 14. https://learnenglish.britishcouncil.org/skills/listening 15. https://www.nationalgeographic.com/podcasts/overheard 16. https://www.youtube.com/user/NatureVideoChannel 17. https://www.youtube.com/watch?v=Aj-EnsvU5Q0&list=PLcetZ6gSk969oGvAI0e4_PgVnlGbm64bp 18. https://www.merriam-webster.com/word-of-the-day 19.https://www.newyorker.com/tag/book-reviews

Course Name	Differential Equations	Course Code	MA1001			
Offered by Department	SH-Mathematics	Structure (LTPC)	3	1	0	4
To be offered for	B.Tech	Course Type	Core			
Pre-requisite	NIL	Approved In	Senate-44			
Learning Objectives	To provide an exposure to the theory of ODEs & PDEs and the solution techniques.					
Contents of the course	Linear ordinary differential equations with constant coefficients, method of variation of parameters – Linear systems of ordinary differential equations (10) Power series solution of ordinary differential equations and Singular points Bessel and Legendre differential equations; properties of Bessel functions and Legendre Polynomials (12) Fourier series (6) Laplace transforms elementary properties of Laplace transforms, inversion by partial fractions, convolution theorem and its applications to ordinary differential equations (6) Introduction to partial differential equations, wave equation, heat equation, diffusion equation(8)					
Essential Readings	1. Simmons. G.F, Differential Equations, Tata McGraw Hill, 2003. 2. Kreyszig. E, Advanced Engineering Mathematics, Wiley, 2007.					
Supplementary Reading	1. William. E. Boyce and R. C. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 8th Edn, 2004. 2. Sneddon. I, Elements of Partial Differential Equations, Tata McGraw Hill, 1972. 3. Ross. L.S, Differential Equations, Wiley, 2007. 4. Trench, W, Elementary Differential Equations, http://digitalcommons.trinity.edu/mono					

Course Name	Engineering Graphics	Course Code	ME1001			
Offered by Department	Mechanical Engineering	Structure(LTPC)	2	0	4	4
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	• To introduce the basic concepts and techniques of technical drawing. • 2D and 3D representation of various shapes/objects and its engineering applications.					
Learning Outcomes	Students will acquire visualization skills and will be able to prepare technical drawings and 3D models using computer aided tools.					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	• Role of technical drawing in product development process, Basics of technical drawing, Standards, Dimensioning principles. *(L2+P4hrs.)* • Computer aided drafting. *(L2+P8hrs.)* • Engineering curves and its applications. *(L4+P8hrs.)* • Principles of orthographic projection. Orthographic projection of points, lines, planes and regular solids, Exercises related to engineering applications. *(L7+P8hrs.)* • Principles of iso metric projections. Orthographic to iso metric and iso metric to ortho graphic transformation of objects. *(L3+P8hrs.)* • Section and inter section of regular solids and their lateral developments. • *(L6+P12hrs.)* • Introduction to 3D modelling of shapes and objects; electrical CAD. *(L2+P4hrs.)*					
Essential Reading	1. K.Venugopal and V Prabhu Raja, Engineering Drawing + Auto CAD, New Age International (P) Limited. 5th Edition Reprint: July, 2016 2. Narayana.K.L, and Kannaiah.P, Engineering Drawing, Scitech Pub. Pvt. Ltd, 3. 3rdEdition.					
Supplementary Reading	1. PI Varghese, Engineering Graphics, McGraw Hill Education, 2013. 2. Bhatt.N.D, Engineering Drawing–Plane and Solid Geometry, Charotar Publishing House Pvt. Ltd., 53rd Edition 2014.					

Course Name	Elementary Data Structures And Logical Thinking	Course Code	CS1002			
Offered by Department	Computer Science Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	The focus is to discuss how data is organized and retrieved in computers. Elementary data structures with supporting operations shall be discussed. Students will be exposed to art of logical thinking through algorithmic puzzles.					
Learning Outcomes	At the end of the course, given a computational problem, students are expected to come up with an algorithm and a suitable data structure, and implement the same Using a programming language.					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	• History of Computing and Computers– the need for data organization– introduction to abstract data types and data structures (3L) • Introduction to logical thinking (algorithmic thinking) through simple examples. Introduction to Elementary data structures - Discussion on Stacks and Queues with supporting operations– implementation using arrays and lists–implementation of stack using queues and vice-versa – variants of stacks and queues– algorithmic puzzles (10L) • Arrays and applications- algorithmic puzzles involving arrays- sorting and searching. (8L) • Discussion on linked lists with various supporting operations- algorithmic puzzles involving lists. Types of Lists – double, circular – the need for double and circular linked lists–puzzles involving lists (10L) • Introduction to trees, binary trees, search trees (7L) • Applications of elementary data structures in computer science and engineering. (7L)					
Essential Reading	1. M. A. Weiss, Data Structures and Algorithm Analysisin C, 2nd ed., Pearson, 2002. 2. Anany Levitin and Maria Levitin, Algorithmic Puzzles, Oxford University Press, 2011.					
Supplementary Reading	1. Narasimha Karumanchi, Data Structure and Algorithmic Thinking with Python, Career monk Publications, 2017					

Course Name	Sociology of Design	Course Code	DS1001			
Offered by Department	SIDI	Structure (LTPC)	1	2	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	Foundation Program	Approved In	Senate 43			
Learning objectives	The objective of the course is to introduce engineering students to the importance of understanding the social context of technology and product design: • Observing the problem context and surfacing unstated user/ customer needs/ new product concepts, • Understanding people, team dynamics and working in multicultural /cross-functional/distributed teams.					
Learning Outcome	At the end of the course, the students should be in a position to: • Understand the need and the process of doing an ethnographic study • Surface unstated needs and articulate the high level product requirements Connect with people, form teams and collaborate towards a common goal					
Contents of the course(With approximate breakup of hours)	Module1: Technology, Design and Society-[9hrs] • Observe the way people interact with objects • Understanding the relationship between people and a variety of objects • Actor Network Theory; History of Technology and Design; 2-3 Case studies • Discovery our passion and domain of interest & network to identify partners Module2: Understanding user/ customer contexts [21hrs] • Ethnography- immersion in a problem context • Learning to observe- see and listen; • Developing rich pictures; Giga mapping • Introduction to signs and semiotic analysis Module3: Understanding groups (multicultural / cross-functional teams) [12hrs] • Learning team formation and dynamics through a movie; • Introduction to sociological imagination - Functionalism, Conflict Theory, Symbolic Interactionism; Interaction Ritual Chains • Values, culture, methods of engineers and designers and how they shape the quality of our lives; • Groupdynamicswithinorganizationsandacrossorganizationsandimplications for innovation and change Evaluation: Continuous assessment(40%); Final ethnography report(20%); End Semester(40%)					
Essential & Supplementary Reading	1. Trevor Pinch (Editors) (2012), The Social Construction of Technological Systems: New directions in the sociology and history of technology, MIT Press, Anniversary Edition 2. Wendy Gunn, Ton Otto and Rachel Smith (2013), Design Anthropology: Theory and practice, Bloomsbury 3. Adrian Forty (2014), Objects of desire: Design and society since1750s, Thames & Hudson 4. Bernhard E Burdek (2015), History, theory and practice of product design, second revised edition 5. Keri Smith(2008), How to be an Explorer of the World: Portable Life Museum, Penguin Group					

Course Name	Design and Manufacturing Lab.	Course Code	ID1000			
Offered by Department	SIDI	Structure(LTPC)	0	0	2	1
To be offered for	B.Tech	Course Type	Core			
Pre-requisite	NIL	Approved In	Senate-44			
Learning Objectives	The objective of this course is to give an exposure on the basic practices followed in the domain of mechanical, electrical, electronics and communication engineering. The exercises will train the students to acquire skills which are very essential for the engineers through hands-on sessions.					
Contents of the course	Experiments will be framed to train the students in following common engineering practices: Basic manufacturing processes: Fitting, Drilling & tapping, Material joining processes, Carpentry, Sheet-metal work, Adhesive bonding and plastic welding, Arc Welding, 3D Printing. (10 hours) Familiarization of electronic components by Nomenclature, meters, power supplies, function generators and Oscilloscope – Bread board assembling of simple circuits: IR transmitter and receiver –LED emergency lamp–Communication study: amplitude modulation and demodulation. (6 hours) Domestic wiring practice: Fluorescent lamp connection, Staircase wiring – Estimation and costing of domestic and industrial wiring – power consumption by Incandescent, CFL and LED lamps. (2 Hours) Dismantle and assembly of PC. Installing OS and disk management.(4 hours)					
Essential Reading	1. UppalS.L., "Electrical Wiring & Estimating", 5th Edn, Khanna Publishers, 2003. 2. Chapman.W.A.J., Workshop Technology, Part1&2, Taylor & Francis.					
Supplementary Reading	1. ClydeF.Coombs, "Printed circuits hand book",6th Edn, McGraw Hill,2007. 2. John H. Watt, Terrell Croft, "American Electricians' Handbook: A Reference Book for the Practical Electrical Man", Tata McGrawHill,2002.					

Course Name	Applied Mechanics	Course Code	ME1002			
Offered by Department	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	Materials for Engineers	Approved In	Senate -44			
Learning Objectives	This course is intended to give an understanding of • The force and moment systems on mechanical structures • The equations governing rigid body systems • The behavior of solid bodies subjected to various types of loads. • The connection between the properties of materials and the behavior of physical systems.					
Learning Outcomes	At the completion of the course, the student will be able to • Analyze the interactions of various structural elements • Apply the principles to practical structural analysis • Carryout design and failure analyses of basic mechanical structures.					
Course Contents (with approximate breakup of hours for lecture/tutorial/ practice)	• Engineering mechanics: • Equivalent force systems, free body concepts, equations of equilibrium; Trusses (L12) • Strength of materials: • Stress, strain and their relation for simple tension, compression and shear; Axial load; Torsion (L9) • Bending– Shear force and Bending moment, Stresses, Deflection; Euler's theory of columns (L9) • Analysis of stress and strain– Transformations, Principal stresses and strains, Plane stress, Mohr's circle; Thin cylinders; Theories of failure. (L12)					
Essential Reading	1. B.J.Goodnoand J.M.Gere, Statics and Mechanics of Materials, CL Engineering, SI edition, 2018. ISBN-13:978-133364412.					
Supplementary Reading	1. F.P.Beer,E.R.Johnston, J.T.Dewolf, and D.F.Mazurek, Statics and Mechanics of Materials, McGrawHill,3rd edition, 2021, ISBN-13:978-0073398167. 2. R.C.Hibbeler, Statics and Mechanics of Materials, 5th edition, Pearson education, 2016, ISBN-13:978-0134382593. 3. W.F.Riley, L.D.Sturges and D.H.Morris, Statics and Mechanics of Materials: An integrated approach, Willey, 2nd edition, 2018, ISBN-13:978-0471013341. 4. A.Bedford, K.Liechti and W.Fowler, Statics and Mechanics of Materials, 5th edition, Pearson education, 2002, ISBN-13:978-0130285935.					

Course Name	Elementary Data Structures And Logical Thinking Practice	Course Code	CS1003			
Offered by Department	Computer Science Engineering	Structure(LTPC)	0	0	4	2
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	• The focus is to discuss how data is organized and retrieved in computers. • Elementary data structures with supporting operations shall be discussed. Students will be exposed to art of logical thinking through algorithmic puzzles.					
Learning Outcomes	At the end of the course, given a computational problem, students are expected to Come up with an algorithm and a suitable data structure, and implement the same using a programming language.					
Course Contents(with approximate breakup of hours for lecture/tutorial practice)	• Case studies that motivates logical thinking (algorithmic thinking) –implementation using C programming • Case studies involving arrays and implementation – Arrays with various supporting operations- algorithmic puzzles involving arrays – sorting and searching • Examples on linked lists with various supporting operations- algorithmic puzzles involving singly, doubly and circular linked lists. –puzzles involving lists • Case studies on Stacks and Queues with supporting operations – implementation using arrays and lists – implementation of stack using queues and vice-versa –variants of stacks and queues– algorithmic puzzles • Applications of elementary data structures in computer science and engineering and implementation					
Essential Reading	1. M. A. Weiss, Data Structures and Algorithm Analysisin C, 2nd ed., Pearson, 2002. 2. Anany Levitin and Maria Levitin, Algorithmic Puzzles, Oxford University Press, 2011					
Supplementary Reading	1. Narasimha Karumanchi, Data Structure and Algorithmic Thinking with Python, Career monk Publications, 2017					

Course Name	Applied Mechanics Practice	Course Code	ME1003			
Offered byDepartment	Mechanical Engineering	Structure(LTPC)	0	0	2	1
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Materials for Engineers	Approved In	Senate-44			
Learning Objectives	This course is intended to give a hands-on experience to • Relate theoretical principles of rigid body mechanics to various practical systems • Find the properties of materials by applying various experimental methods. • Apply the equations and see there al time behavior of deformable bodies and various structural elements • Handle the instruments and present the results					
Learning Outcomes	At the completion of the course, the student will be able to • Analyze the interactions of various structural elements experimentally • Do mechanical characterization of the materials • Apply standard methods of testing materials.					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	Experiments to investigate the variation of static coefficient of friction with various combinations of material surfaces and radius of gyration with bar and torsional pendulums. (P9) Experiments to measure various material properties such as rigidity modulus, Young's modulus, flexural modulus, Poisson's ratio, etc. (P12) Experiments to study the influence of microstructure on Young's modulus, hardness, tensile strength, creep, etc. (P6) Experiments to study the influence of geometry and the strength of materials on structural elements like beam and column. (P6)					
Essential Reading	1. B.J.Goodno and J.M.Gere, Statics and Mechanics of Materials, CL Engineering, SI edition, 2018. ISBN-13:978-133364412.					
Supplementary Reading	1. F.P.Beer, E.R.Johnston, J.T.Dewolf, and D.F.Mazurek, Statics and Mechanics of Materials, McGrawHill, 3rd edition, 2021, ISBN-13:978-0073398167. 2. R.C.Hibbeler, Statics and Mechanics of Materials, 5th edition, Pearson education, 2016, ISBN-13:978-0134382593. 3. W.F.Riley, L.D.Sturges and D.H.Morris, Statics and Mechanics of Materials: An integrated approach, Willey, 2nd edition, 2018, ISBN-13:978-0471013341. 4. A.Bedford, K.Liechti and W.Fowler, Statics and Mechanics of Materials, 5th edition, Pearson education, 2002, ISBN-13:978-0130285935.					

Course Name	Earth, Environment and Design	Course Code	NC1008			
Offered by Department	SIDI	Structure (LTPC)	1	0	0	0
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	The course aims to provide an understanding of systems and processes in aquatic and terrestrial environments, and to explore changes in the atmosphere, lithosphere, hydrosphere, biosphere, and the evolution of organisms, since the origin of life on earth.					
Course Contents (with approximate breakup of hours for lecture/ tutorial/practice)	• Introduction to environment and ecology – Ecosystems Impacts of natural and human activities on ecosystems • Environmental policies, acts and standards, Environmental Impact Assessment Prediction and assessment of the impacts on air, water, land, and biological environments Assessment of impacts of the cultural, socioeconomic and eco sensitive environments					
Essential Reading	1. Rubin. E. S, Introduction to Engineering and the Environment, McGraw Hill, 2000. 2. Masters. G. M., Introduction to Environmental Engineering & Science, Prentice Hall, 1997.					
Supplementary Reading	1. Henry. J. G, and Heike, G. W, Environmental Science & Engineering, Prentice Hall International, 1996. 2. Dhameja. S. K, Environmental Engineering and Management, S. K. Kataria and Sons, 1999. 3. Shyam Divan and Armin Rosancranz, Environmental Law and Policy in India, Cases, Materials and Statutes, Oxford University Press, 2001.					

Course Name	Systems Thinking for Design	Course Code	DS2000			
Offered by Department	SIDI	Structure(LTPC)	1	2	0	3
To be offered for	B.Tech	Course Type	Core			
Pre-requisite	Sociology of Design	Approved In	Senate-43			
Learning Objectives	Design for effectiveness –Level 1					
Learning Outcomes	This course will help students understand • The importance of modeling systems to realize effective designs • Abstraction of key elements from problem situations Use of specific techniques to model problems in a holistic manner					
Contents of the course	• Real-world problems & the need for inter-disciplinary approaches [2] • Basic concepts of systems thinking (parts, relations, patterns) [6] • Technique#1: Rich Pictures • Technique#2: Mapping Stake holder, Needs, Alterables, Constraints [6] • Technique#3: Structural Modeling (Hierarchical decomposition) [6] • Technique#4: Influence Diagrams (Self-regulating systems) [6]					
Essential Reading	1. Hitchins, DerekK. (2007) Systems Engineering: A 21st Century Systems Methodology, John Wiley, ISBN: 978-0-470-05856-5. 2. Wilson, Brian (1991) Systems: Concepts, Methodologies and Applications. 2nd Edition, Wiley. ISBN: 0471927163. Hutchinson, William; Systems Thinking and Associated Methodologies, Praxis Education. ISBN: 0 646 34145 6.					
Supplementary Reading	1. Gerald Wienberg (2001), An introduction to general systems thinking, Dorset House Publishing. 2. Sage, A.P.(1977); Methodology for Large Scale Systems, McGraw Hill, New York.					

Course Name	ManufacturingProcesses-1	Course Code	ME2003			
Offered by Department	Mechanical Engineering	Structure(LTPC)	3	1	0	4
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Materials for Engineers	Approved In	Senate-44			
Learning Objectives	To study the fundamentals of manufacturing processes and equipment.					
Learning Outcomes	• At the end, the students will be able to select the range of manufacturing processes suitable to realize the intended physical components / products. • At the end the students will be able to identify the causes of the defects if any found in the components/ products manufactured and rectify using suitable combinations of parameters.					
Course Contents(with approximate breakup of hours for lecture/tutorial/practice)	**Molding and Casting Practices:**(16*L*+ 5 *T)* Introduction to casting and foundry industry; basic principle; sequence in foundry operations; patterns; molding practice; ingredients of moldings and cores. Melting furnaces. Special casting techniques: investment casting, shell molding, die casting, centrifugal casting, plaster mould casting, magnetic casting, squeeze casting, full mould process, strip casting, CO_2 molding. Gating system design. Casting defects and foundry automation. **Forming and Forging:**(14*L*+ 5 *T*) Basics of plastic forming & forging, forging process–classification–equipment – Calculation of forging loads–forging defects–residual stresses, rolling and extrusion–classification-rolling mills-rolling of bars & shapes–rolling forces – Defects in rolling- theories of hot & coldrolling–torque power estimation. Extrusion: classification- equipment– deformation lubrication and defects– analysis– hydrostatic extrusion– tube extrusion. Drawing & sheet metal forming- rod & wire drawing, deep drawing, tube drawing, shearing and blanking. **Welding processes:**(12*L*+ 4 *T)* Classification of welding processes, V-I relationship, types of weld joints. Fusion welding processes, solid state welding processes, thermo-chemical welding processes, brazing and soldering. Weld Metallurgy; concept of HAZ, defects in welds, their causes and remedies.					
Essential Reading	1. S.Kalpakjian, S.R.Schmidt, Manufacturing Engineering and Technology, 7^{th}edition, Pearson India, 2009. ISBN: 978-0133128741 2. M.P.Groover, Principles of Modern Manufacturing, 5^{th}edition, Wiley, 2014. 978-8126547371.					
Supplementary Reading	1. B.Wulff, H.F.Taylor and M.C.Fleming, Foundry Engineering, Wiley Eastern, 2009. 2. American Welding Society, Welding Handbook, AWS, 2009. 3. G. E Dieter, Mechanical Metallurgy, TataMcGraw Hill,2007.					

Course Name	Theory of Machines and Design	Course Code	ME2011			
Offered by Department	Mechanical Engineering	Structure(LTPC)	3	0	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	Applied Mechanics	Approved In	Senate-44			
Learning Objectives	• To understand the kinematics and kinetics of various planar mechanisms. • To understand design concepts and procedures necessary to design and/or select a machine component in terms of geometry and materials.					
Learning Outcomes	At the end of the course, a student will be able to: • Investigate the motion of planar mechanisms using graphical and analytic methods. • Apply multidimensional failure criteria in the analysis and design of machine components. • Design of power transmission systems involving shafts, gears, belts and bearings.					
Course Contents	• Introduction to mechanisms-joints, pairs and couplings; Constraints, mobility and degree of freedom, mobility criterion, Grashof's law.(6L) • Analysis of Planar Mechanism (Position, Velocity and Acceleration); Cams and Followers.(8L) • Design based on Failure theories; Design of Shafts, Keys and Couplings.(8L) • Design of Joints-Bolted, Riveted and Welded Joints (8L) • Design of Spur Gears and Belt Drives (6L) • Design of Clutches and Bearings (6L)					
Essential Reading	1. J.J.Uicker, G.R.Pennock and J.E.Shigley, Theory of Machines and Mechanisms, Oxford University Press, 4thEdition, 2014. 2. R.G.Budynas and J.K.Nisbett, Shigley's Mechanical Engineering Design, McGraw-Hill Education, 10thEdition, 2017					
Supplementary Reading	1. Ghosh and A.K.Mallik, Theory of Mechanism and Machines, Affiliated East –West Press Private Ltd., 2009. 2. Norton, R.L., Design of Machinery, Third Edition, TataMcGraw Hill, New Delhi, 2005. 3. V Bhandari, Design of Machine Elements, McGraw-Hill Education, 4thEdition, 2017. 4. Robert L.Norton, Machine Design, Pearson Education, 5th Edition, 2018					

Course Name	Electrical Drives	Course Code	EC2005			
Offered by Department	Electronics & Communication Engineering	Structure(LTPC)	2	0	0	2
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Basic Electrical Engineering	Approved In	Senate-44			
Learning Objectives	● In this course fundamental applications of electromechanical and power electronic systems will be studied as applied to mechanical systems. ● The capabilities and limitations of different types of electric machines (e.g., permanent magnet, induction) in various drive applications will be covered					
Learning Outcomes	At the end of the course, a student will be able to, ● Understand how power electronic rectifiers, converters and inverters operate. ● Possess an understanding of control of electrical drives. ● Analyze and compare the performance of DC and AC machines. ● Select and design a suitable drive system for the given application.					
Course Contents	Energy conversion principles, Introduction to Electrical Drives, controlled Rectifiers, DC/DC converters, inverters (L6) Characteristics and control (starting, braking and speed control-static methods only) of Basic machine types: DC motor (L8) Three phase Induction motor (L8) BLDC motor (L3) Servo motor, torque motor, stepper motor (L3)					
Essential Reading	1. Gopal K. Dubey, Fundamentals of Electrical Drives, 2nd edition, Narosa, January 2010, ISBN-13: 978-8173194283 2. Ned Mohan, Electric Machines and Drives: A First Course, 1st edition, Wiley, 2012.					
Supplementary Reading	1. Vedam Subramanyam, Electric Drives, McGraw Hill, 2017, ISBN-13: 978-0070701991 2. D.P. Kothari, Rakesh Singh Lodhi, Electric Drives, TMH, June 2020 3. I. Boldea, S. A. Nasar, Electric drives, 3rd edition, CRC Press, 2017.					

Course Name	Sensors and Controls	Course Code	ME2012			
Offered by Department	Electronics & Communication Engineering	Structure(LTPC)	3	0	0	3
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Electric Circuits and Mathematics	Approved In	Senate-44			
Learning Objectives	The objective of this course is • to learn the basic working principle and operation of various sensors and its characteristics • to leverage the application of seniors in engineering application (c) to learn the concepts of control systems.					
Learning Outcomes	At the end of the course, a student will be able • to leverage sensors for various engineering applications and choose sensors for required specification • to understand control systems and its relevance different applications					
Course Contents	Introduction: Description of measuring devices- static and dynamic characteristics, calibration, active and passive sensors, transducers, classifications. (L6) Displacement Sensors- Resistivestraingauge, LVDT, RVDT, capacitive, piezo, seismic pickups. proximity, vibrometers and accelerometers-conventional and semiconductor based sensors. (L8) Sensors for flow, temperature, force, pressure, Radiation and torque, Hall effect –Current and speed measurements – conventional and semiconductor based sensors- Digital measurement techniques. (L8) Optical Sensor: Lasers. photo- detectors and optical fiberas sensors, Application of sensors in Robotics – Internal Sensors, External sensors – touch and slip sensors-Robotic vision, Process of Imaging, Vision Systems, and its components, Image Representation and Processing. (L8) Chemical, magnetic and other signals, Catalytic devices, gas sensors and acoustic sensors. (L4) Open and closed loop systems, actuators-electrical, pneumatic and hydraulic, Transfer functions- root locus method, Design of controllers - case studies(L8)					
Essential Reading	1. J.Vetelino and A.Reghu, Introduction to sensors, CRC Press,2010 2. Norman S Nise, Control System, John Wiley, 7th Edition, 2015 3. A.K.Sawhney, A Course in Electronic Measurements and Instrumentation, Dhanpat Rai, 2015					
Supplementary Reading	1. T. G.Beck with, R.D.Marangoni and J. H.Lienhard V., Mechanical Measurements, Pearson Prentice Hall, 2009. 2. J.Fraden, Handbook of Modern Sensors: Physics, Designs and Applications, 4th 3. edition, Springer, 2010 4. Doebelin, Measurement systems: Applications and Design, 5thedition, McGrawHillBook, 2004.					

Course Name	Manufacturing Processes Practice-1	Course Code	ME2004			
Offered by Department	Mechanical Engineering	Structure(LTPC)	0	0	3	1.5
To be offered for	B.Tech	Course Type	Core			
Prerequisite	Basics of Manufacturing Processes	Approved In	Senate-44			
Learning Objectives	To perform experiments on fundamental manufacturing processes to understand the process, equipment, tooling and set-up involved in these processes.					
Learning Outcomes	• At the end, students will be able to apply: • A suitable casting process to shape the component and identify the defects involved and rectify them. • Select suitable welding processes based on the application. • The concepts of different forming processes and thus to get desired part shape. • Can identify the effect of process parameters on the outputs and can select suitable process parameter values.					
Course Contents	• Determination of molding properties of sodium silicate bonded sand • Study of the shrinkage behavior during phase change processes • Study of sheet metal forming processes • Study on the spring back informing processes • Study of injection molding process • Study of manual metal arc welding process • Study of gas metal arc welding (GMAW) process • Study of gas tungsten arc welding processes • Study of friction stir welding processes • Study on process control and optimization in welding and casting					
Essential Reading	1. S.Kalpakjian, S.R.Schmidt, Manufacturing Engineering and Technology, 7thedition, Pearson India, 2009. ISBN: 978-0133128741 2. E.P.DeGarmo, J.T.Black, and R.A.Kohser, DeGarmo's materials and processes in manufacturing, 11thedition, John Wiley & Sons, 2013. ISBN: 978-8126540464					
Supplementary Reading	1. M.P.Groover, Principles of Modern Manufacturing, 5th Edition , Wiley, 2014. ISBN: 978-8126547371					

<table>
<tr><td>Course Name</td><td>Introduction to Data Management</td><td>Course Code</td><td colspan="4">CS2006</td></tr>
<tr><td>Offered by Department</td><td>Computer Science & Engineering</td><td>Structure (LTPC)</td><td>2</td><td>0</td><td>2</td><td>3</td></tr>
<tr><td>To be offered for</td><td>B.Tech.</td><td>Course Type</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>NIL</td><td>Approved In</td><td colspan="4">Senate-44</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">This course covers the basic concepts of data management, data base systems, and data base applications.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">• Understand the fundamentals of data base systems, design techniques and their use in organizations;
• Comprehend how data base systems are used for strategic and operational decision making;
• Understand managerial issues associated with data base technologies</td></tr>
<tr><td>Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)</td><td colspan="6">Need for Efficient Data Management-Data Modeling - Entity Relationship Modeling-Relational Schema (5 L)
SQL Constructs-Data Types, Data Definition and Manipulation Language-Key constraints
-Basic Clauses of SQL query (5 L)
Basic and Advanced Operators in SQL, Functions-Table Joins-SQL Simple and Nested Queries -Views (8 L)
Introduction to Mongo DB Architecture- Data set up and querying in Mongo DB – Application development using case studies/ course projects to connect with Databases (10 L)</td></tr>
<tr><td>Essential Reading</td><td colspan="6">1. Fundamentals of Data base Systems- RElmasri, SNavathe,Pearson,2017</td></tr>
<tr><td>Supplementary Reading</td><td colspan="6">1. W3 Schools online references /tutorials on SQL, MongoDB
2. LearningSQL:MasterSQLFundamentals,AlanBeaulieu,SecondEdition,O'Rielly,</td></tr>
</table>

Course Name	Electrical Drives Practice	Course Code	EC2006			
Offered by Department	Electronics & Communication Engineering	Structure(LTPC)	0	0	3	1.5
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Basic Electrical Engineering	Approved In	Senate-44			
Learning Objectives	• To introduce the students to conventional and static methods to control various AC and DC drives used in Industry. • Also to deliver a thorough understanding on feedback control via interfacing various sensors for an automated system.					
Learning Outcomes	At the end of the course, a student will be able to, • Select proper sensors, electrical drive, signal conditioning circuit and controller for the required automation. • Design control algorithms for electric drives which achieve the regulation of torque, speed, or position in the above machines. • Develop Simulink® models which dynamically simulate electric machine and drive systems and their controllers.					
Course Contents	Experiments conducted in this course: • Various sensors incorporated with an understanding and hands on study towards Signal conditioning, Characteristics of Transducers, Calibration of sensors, and Measurement of various physical quantities. • Brings out the basic concepts of different types of electrical machines and their performance. • Introduce the concept of control of conventional electric motors such as DC motor, AC Induction motor and also special machines such as Stepper motor, Permanent magnet brushless motors, Servo motor. • Familiarize various power electronic converters and static control of drives. • Introduces Speed-Torque characteristics of various types of load and drive motors.					
Essential Reading	1. IIITDM Kancheepuram Electrical Drives Practice Manual					
Supplementary Reading	1. Gopal K. Dubey, Fundamentals of Electrical Drives, 2nd edition, Narosa, January 2010, ISBN-13 : 978-8173194283 2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis, and Control," Prentice Hall, 2001. 3. Ned Mohan, Electric Machines and Drives: A First Course, 1st edition, Wiley, 2012.					

<table>
<tr><td>Course Name</td><td>Smart Product Design</td><td>Course Code</td><td colspan="4">DS2001</td></tr>
<tr><td>Offered by Department</td><td>SIDI</td><td>Structure (LTPC)</td><td>1</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>To be offered for</td><td>B. Tech</td><td>Course Type</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>Systems Thinking for Design</td><td>Approved In</td><td colspan="4">Senate-43</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">The objective of this course to help the students understand and apply the concepts of designing smart/intelligent products, i.e., information intensive and context sensitive</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">At the end of the course, the students will:
• Identify and define the right type of intelligent behaviour for a chosen product concept
• Design high-level functional and component (structural) architecture for intelligent behaviour using appropriate metaphor and analogy
• Evaluate and select the right AI technique for the proposed functional and component architecture and vice versa</td></tr>
<tr><td>Course Contents (with approximate breakup of hours for lecture/ tutorial/practice)</td><td colspan="6">Module 1: Introduction to intelligence behaviour (9 hours)
• Definition of intelligence
• Dimensions of intelligence
• Levels of intelligence

Module 2: Architecture for intelligent behaviour (15 hours)
• Functional arch for Intelligent Behaviour (Intelligence and information
• intensity relation (equilibrium, amplification))
• Biological metaphors for cyber-physical systems (Bio-inspired adaptive
• systems (Positive and negative feedback)
• Theory of living systems (Self evolve, self-improve, self-aware (e.g., self-configuration, -organization, -optimization) properties)

Module 3: Selection of appropriate AI Techniques (18 hours)
Rule-based systems - Fuzzy inferencing - Artificial neural networks -
• Evolutionary computation -
• determine which type of intelligent system methodology would be suitable
• for a given type of application problem
• Demonstrate a working prototype, in the form of a major project work, the
• ability to design and develop an intelligent system for a selected application.
• Poster Session
• Evaluation: Continuous assessment (40%); Final concept presentation (20%); End Sem (40%)</td></tr>
<tr><td>Essential & Supplementary Reading</td><td colspan="6">1. Donald A Norman (2007), The design of future things, Basic Books, New York
2. Dario Floreano and Claudio Mattiussi (2008), Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, MIT Press
3. Michael Negnevitsky (2005), Artificial Intelligence: A Guide to Intelligent Systems, Second Edition, Addison Wesley</td></tr>
</table>

<table>
<tr><td>Course Name</td><td>Manufacturing Processes-2</td><td>Course Code</td><td colspan="4">ME2007</td></tr>
<tr><td>Offered by Department</td><td>Mechanical Engineering</td><td>Structure (LTPC)</td><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>To be offered for</td><td>B.Tech.</td><td>Course Name</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>Materials for Engineers
Manufacturing Processes -I</td><td>Approved In</td><td colspan="4">Senate-44</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">To study the fundamentals of machining processes and machine tools.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">● At the end students will be able to select and apply a suitable machining process and cutting tool upon the work piece material and geometry.
● At the end students will be able to identify the machining defects and solution to overcome the same.
● At the end students will be able to utilize the powder metallurgy concepts.</td></tr>
<tr><td>Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)</td><td colspan="6">Machining and Cutting Tool: (6 L+ 2 T)
Material removal. Elements, fundamental, mechanism of deformation in metal cutting. Geometry & design of single and multi-point tool
Mechanics of Chip Formation: (6 L+ 2 T)
Orthogonal & oblique cutting, mechanism of chip formation, chip types, mechanics of machining. Forces and stresses on tool and its distribution, cutting force measuring technique.
Heat flow in metal cutting and tool life: (6 L+2 T)
Heat flow in primary, secondary and tertiary zones, tool temperature measurement, temperature distribution in tool. Machinability, tool life, Taylor’s equation, tool failure, economics in metal machining.
Cutting Tool material and Cutting life: (8 L+ 3 T)
Tool materials, Alloying elements in tool steel. Carbon steel, high speed steels, co-cast alloys, carbide tools, ceramic tools, diamond. Function & requirement of cutting fluid. Type of cutting fluid. Method of application of cutting fluids.
Abrasive Machining Processes and Broaching: (8 L+ 3 T)
Abrasive processes, grinding wheel-specifications and selection, types of grinding process, concepts of surface integrity, broaching machines, broach construction
Processing of Powder metals: (8 L+ 2 T)
Production and compaction of metal powders, sintering, design and process capabilities. Forming, shaping and machining of ceramics. Processing semiconductors, elastomers, metal matrix composites and ceramic-matrix composite.</td></tr>
<tr><td>Essential Reading</td><td colspan="6">1. S.Kalpakjian, S.R.Schmidt, Manufacturing Engineering and technology, 7th edition, Pearson India, 2009. ISBN: 978-0133128741
2. M.P.Groover, Principles of Modern Manufacturing, 5th edition, Wiley, 2014. 978-8126547371.</td></tr>
<tr><td>Supplementary Reading</td><td colspan="6">1. E.P.DeGarmo, J.T.Black, and R.A.Kohser, DeGarmo's materials and processes in manufacturing, 11th edition, John Wiley & Sons, 2013.
2. 2.D.A.Stephenson, and J.S.Agapiou, Metal cutting theory and practice, CRC Press, 2005.</td></tr>
</table>

Course Name	Thermal and Fluids Engineering	Course Code	ME2014			
Offered by Department	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	● To introduce different concepts and governing equations for thermodynamics and fluid mechanics. ● To apply the learned concepts to a few real-life cases.					
Learning Outcomes	At the end of this course the students will be able to ● Understand and apply the concepts of thermodynamics, fluid mechanics and heat transfer. ● Analyze different thermodynamic cycles used in practical cases. ● Solve various basic fluid mechanics and heat transfer problems as a foundation for advance courses					
Course Contents	**Thermodynamics** *(L8+T3)* Laws of thermodynamics - zeroth, first and second, concept of temperature, energy, and entropy, Calculations for work and heat transfer for a system and control volume **Fluid Mechanics** *(L18+T6)* Fluid properties – Density, viscosity, surface tension, capillary action Fluid statics, concepts of pressure, stability of submerged and floating object Fluid Dynamics – Lagrangian and Eulerian definition, concept of velocity and acceleration, equations of continuity and momentum, Bernoulli's equation, flow through pipes, laminar and turbulent flows, Dimensionless analysis **Heat Transfer** *(L16+T5)* Conduction – Fourier law, 1-D conduction, rectangular and polar coordinate system, insulation, Convection – forced convection, natural convection, thermal and hydraulic boundary layer Radiation – basic concepts and application					
Essential Reading	1. Yunus Cengel; Robert Turner, Fundamentals of Thermal-Fluid Sciences, McGraw-Hill Higher Education, 3rd edition 2008.					
Supplementary Reading	1. Cengel, Y.A. and Boles, M.A., 2007. *Thermodynamics: An Engineering Approach 6th Edition (SI Units)*. The McGraw-Hill Companies, Inc., New York. 2. *Introduction* to fluid mechanics and fluid machines, S Som, G Biswash, S Chakraborty, 3e. Tata McGraw-Hill Education, 2017. 3. Bergman, T.L., Incropera, F.P., Lavine, A.S. and Dewitt, D.P., 2011. *Introduction to heat transfer*. John Wiley & Sons.					

Course Name	Operations Research	Course Code	ME2015			
Offered by Department	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved By	Senate-44			
Learning Objectives	To learn various tools and quantitative techniques for solving business decision problems and finding optimal solutions and build capabilities in students to analyze different problematic scenarios in industries involving limited resources and effective decision making					
Learning Outcomes	• Ability to understand and analyze the real life operational problems which involves resource constraints • Ability to formulate mathematical model to various Industrial/ business decision problems • Ability to use appropriate tools and techniques to solve various Industrial/ business decision problems, determine the optimal solution and to make effective business decisions.					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	**Introduction to OR:** Role of Operations research in decision-making, types of OR Techniques, and constructing the model. (L2) **Linear Programming:** Introduction, Assumptions, Formulation of LP Problem, Applications and Limitations (L4) **Linear Programming Techniques:** Graphical Method, Algebraic method, Simplex Method, Big M method, Two phase method, Degeneracy, Alternate Optimum, unboundedness, infeasibility, LP Solvers (L10) **Duality and Sensitivity Analysis:** Importance of Duality concepts, Formulation **of** Dual problems, Dual Simplex, Sensitivity Analysis (L4) **Transportation Problem:** Least cost method, North West corner rule, Vogel's approximation method, MODI method, degeneracy in transportation model, unbalanced and maximization models. (L6) **Assignment Problem:** Difference between transportation problem and assignment problem, Hungarian algorithm, unbalanced assignment problems, Routing Problems, traveling salesman problem (L6) **Integer Programming Problem:** Introduction, Types of IPP, Formulation, rounding off Algorithm, Branch and Bound Algorithm (L4) **Project Scheduling:** Basic terminologies, constructing a project network, CPM and PERT (L4) **Queuing models**: Notation of queues, performance measures, The M/M/1 and M/M/m queue (L3) **Production Scheduling:** Single Machine Flow shop and Job Shop Scheduling(L2)					
Essential Reading	1. HamdyATaha, "Operations Research– An Introduction", Pearson Education, New Delhi, 2014. 2. G.Srinivasan, Operations Research Principles and Applications, PHI, 3rd Edition 3. R. Paneerselvam, Operations Research, PHI, 2nd Edition					
Supplementary Reading	1. A.Ravindran,, D.T.Phillips, J.Solberg Operation Research: Principles and Practice, Wiley Edition, Newyork. 2. Frederick S.Hiller and Gerald J.Lieberman, Inroduction to Operations Research, McGraw-Hill, 2012					

Course Name	Production Drawing Practice	Course Code	ME2016			
Offered by Department	Mechanical Engineering	Structure(LTPC)	0	0	3	1.5
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	Basics of Engineering Graphics	Approved In	Senate-44			
Learning Objectives	Develop the necessary skills to prepare production drawings and 3D modeling					
Learning Outcomes	At the end of the course, a student will be able to: • Represent and understand drawing symbols and geometric dimensioning and tolerance • Create 3D models of parts and assembly, and exploded views of assembly using CAD software • Prepare production drawings of machine components					
Course Contents	**Representation:** Layout of drawing sheet, title block, conventional representation of materials, machine components, welding symbols, hydraulic, pneumatic symbols, surface roughness symbols. (P9) **Limits, Fits and Tolerances:** Types of fits, exercises involving selection/interpretation of fits and estimation of limits from tables. (P3) **Form and Positional Tolerances:** Introduction and indication of the tolerances of from and position on drawings, deformation of run out and total run out and their indication. (P6) **3D Part Modelling and Assembly:** Development of 3D models of machine components using CAD software, assembly of machine components and drafting of assembly using CAD software with fits. (P9) **Production Drawings:** Creation of production drawings of parts with indications of size, dimensional and geometric tolerances, welding and surface roughness symbols, form and position errors using CAD software. (P12)					
Essential Reading	1. G. Bertoline, E. Wiebe, N. Hartman and W. Ross, Technical Graphics Communication, 4th edition, Tata McGraw Hill, 2008.					
Supplementary Reading	1. J.D.Meadows, Geometric Dimensioning and Tolerancing, CRC Press,2009.					

<table>
<tr><td>Course Name</td><td>Manufacturing Processes Practice-2</td><td>Course Code</td><td colspan="4">ME2010</td></tr>
<tr><td>Offered By Department</td><td>Mechanical Engineering</td><td>Structure (LTPC)</td><td>0</td><td>0</td><td>3</td><td>1.5</td></tr>
<tr><td>To be offered for</td><td>B.Tech</td><td>Course Type</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>Basics of Manufacturing Processes</td><td>Approved In</td><td colspan="4">Senate-44</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">To study and practice the various operations that can be performed in lathe, milling machines etc. And to equip with the practical knowledge required in the core industries.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">At the end of this course the student will be able to select and apply
• Methods to solve problems on cutting forces, tool life and analytical methods of estimating cutting temperature.
• Suitable machining operations to subtractive remove the materials and thus to get the component/ work piece with desired geometry.</td></tr>
<tr><td>Course Contents</td><td colspan="6">Lathe Exercises
Machining and machining time estimations for
● Taper Turning
● External Thread cutting
● Internal Thread Cutting
● Knurling
Milling Exercises
● Simple prismatic parts
● Contour milling using vertical milling machine
● Spur gear cutting in milling machine
● Helical gear cutting in milling machine
Drilling Exercises
● Effect of Primary Cutting Edges
● Effect of Secondary Cutting Edges
Grinding Exercises
● Plain Surface grinding
● Cylindrical grinding
Determination of material removal rate in various processes
Measurement of cutting forces in basic processes</td></tr>
<tr><td>Essential Reading</td><td colspan="6">1. S.Kalpakjian, S.R.Schmidt, Manufacturing Engineering and Technology, 7th edition, Pearson India, 2009. ISBN: 978-0133128741</td></tr>
<tr><td>Supplementary Reading</td><td colspan="6">1. M.P.Groover, Principles of Modern Manufacturing, 5th edition, Wiley, 2014. ISBN: 978-8126547371</td></tr>
</table>

Course Name	Embedded Systems Practice	Course Code	EC2012			
Offered by Department	Electronics & Communication Engg.,	Structure(LTPC)	1	0	2	2
To be offered for	B.Tech.	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	To familiarize with the design and implementation of different embedded systems with real time applications.					
Learning Outcomes	The course would equip the students to design embedded systems using ARMSoC platforms. They would also be familiarized with the usage of RTOS for system design and IoT systems design.					
Course Contents (with approximate breakup of hours for lecture/tutorial/ practice)	Implementation of embedded systems Tiva Launchpad and TM4C microcontroller setup and Parallel I/O: LED sands witches. Embedded systems design using ARM Cortex, Stepper motor and Servo motor interfacing, Real-time operating systems in embedded systems.					
Essential Reading	1. J.W.Valavano, Embedded Systems: Introduction to Arm®Cortex (TM)-M Microcontrollers, 5th edition, Create Space, 2012, ISBN-10:1477508996, ISBN-13:978-1477508992. 2. A.S.Berger, Embedded Systems Design: An Introduction to Processes, Tools, and Techniques,CMP,2002. ISBN:1578200733. 3. J.W.Valavano, Embedded Microcomputer Systems: Real Time Interfacing, 2nd edition, Create Space,2006. ISBN 0534551629.					
Supplementary Reading	1. J.W.Valavano, Embedded Systems: Real-Time Interfacing to Arm®Cortex(TM)-M Microcontrollers, 2nd edition, Create Space,2011. ISBN-10:1463590156, ISBN-13:978-1463590154.					

Course Name	Machine to Machine Communication	Course Code	CS2013			
Offered by Department	Computer Science & Engineering	Structure(LTPC)	2	0	2	3
To be offered for	B. Tech.	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	• To introduce the basic concepts and techniques of Machine to Machine Communication. • How to integrate such technology into existing infrastructure					
Learning Outcomes	• Students can able to Identify the main challenges associated with M2M • Communications today, can able to list the main standards, protocols, algorithms, and research activities which address these challenges of today. Can able to identify limits of standards/ protocols and algorithms with respect to M2M communications					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	Introduction to M2M; M2M Current Landscape; Early implementations and deployment of M2M communications. (L4+P2) Introduction to TCP/IP, OSI reference model networking commands: Ping, Trace route, IP config, UDP, congestion control and avoidance (L4+P2) Connecting two nodes using Ethernet cable and study the performance evaluation parameters such as delay, effective band width using socket Programming.(L2+P2hrs) M2M Terminals and Modules–Hardware Interfaces–Power, USB, UART, Antenna, UICC, GPIO, SPI, I2C, ADC, PCM, PWM and Analog Audio, Service, Software Interface. (L4+P4) M2M Architecture and Protocols–M2M Requirements and High Level Architectural Principles. High Level Architecture Principles for M2M Communications. (L4+P2) M2M Service Architectures–High Level Service Architecture; ETSITC M2M Service Capabilities Frame work, M2M service Capabilities, M2M Resource based M2M Communication and Procedures. (L4+P2) Smart Cards in M2M Communication – Security and Privacy issues in M2M communication, hardware-based security solutions, Smart Card Properties for M2M environments (L4+P2)					
Essential Reading	1. D.Boswarthick, O.Elloumi, and O.Hersent, M2MCommunications-A System Approach, Wiley**,** ISBN 978-1-119-99475-6. 2. D.Minoliauth, Building the Internet of Things with IPv6 and MIPv6 The Evolving World of M2M Communications, Wiley, ISBN: 978-1-118-47347-4. 3. C. Anton-Haro, M. Dohler, Machine-to-Machine (M2M) Communications-Architecture, Performance and Applications, Woodhead, ISBN 978178242102.					
Supplementary Reading	1. O.Hersent, D.Boswarthick and O.Elloumi, The Internet of Things: Key Applications and Protocols, Wiley, 2nd edition, 2012, ISBN: 978-1-119- 99435-0. 2. J.Brazell, L.Donoho, J.Dexheimer, R.Hanneman and Langdon, M2M The Wireless Revolution, technical report, Innovation -Creativity– Capital Institute**,** University of Texasat Austin. 3. W. Webb, Understanding Weightless Technology, Equipment, and NetworkDeploymentforM2MCommunications inWhiteSpace,Cambridge,ISBN-13:9781107027077.					

Course Name	Introduction to Data Science for Engineers	Course Code	CS3006			
Offered by Department	Computer Science and Engineering	Structure (LTPC)	3	0	2	4
To be offered for	B.Tech	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	This course covers the basic concepts of Data Science to help the student to learn, understand and practice data analytics encompassing concepts from descriptive, inferential statistics and predictive techniques and big data concepts.					
Learning Outcomes	• Ability to identify the characteristics of datasets; Ability to select and implement machine learning techniques suitable for the respective application; • Ability to solve problems associated with big data characteristics such as high dimensionality; • Ability to integrate machine learning libraries and mathematical and statistical tools					
Course Contents (with approximate breakup of hours for lecture/tutorial/practice)	• Introduction to relevant industry applications and analytics – Descriptive Statistics – Data Visualization & Interpretation -Measures of Central Tendency & Dispersion - Basic and advanced plots such as Stem-Leaf Plots, Histograms, Pie charts, Box Plots, Violin Plots etc. – Merits of Demerits & Interpretation (10) • Inferential Statistics – Hypothesis Testing - Tests of Significance – Analysis of Variance - Regression – Linear and Logistic (8) • Predictive Analytics – Supervised and Unsupervised – Association Rules, Classification, Clustering, Outlier Analysis, Time Series Modeling (14) • Big Data Characteristics – Map Reduce – Deduplication, Distributed Storage, Implementation using Hadoop / Spark platforms (8) • **Practice Component:** Concepts from Descriptive Statistics, Inferential and Predictive Analytics would be test driven using platforms such as Python, R etc. ML support in these platforms for rule mining and application, classification & clustering algorithms etc. would also be test driven as part of the practice exercises. Modern technologies for big data handling such as Spark – support for Map reduce would also be test driven. Applications relevant to the student's stream of specialization would be explored for exercises / course project as case studies. (14 sessions – weekly exercises)					
Essential Reading	1. J Han, M Kamber, Data Mining Concepts & Techniques, Elsevier, 3rd Edition, 2007, ISBN 9780123814791					
Supplementary Reading	1. Joel Grus, Data Science from Scratch, Orielly, 2ndEdn, 2019, ISBN 9781492041139 2. Leskovec, Anand Rajaraman,, Ullmann, Mining of Massive Data Sets, Cambridge University Press, Open Source free version , ISBN 9781107015357 3. P Bruce, Practical Statistics for Data Scientists, O'Reilly, 2017, ISBN 9789352135653					

<table>
<tr><td>Course Name</td><td>Entrepreneurship and Management Functions</td><td>Course Code</td><td colspan="4">DS3000</td></tr>
<tr><td>Offered by Department</td><td>SIDI</td><td>Structure (LTPC)</td><td>1</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>To be offered for</td><td>B.Tech</td><td>Course Type(Core/Elective)</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>Systems Thinking and Design</td><td>Approved In</td><td colspan="4">Senate-43</td></tr>
<tr><td>Learning objectives</td><td colspan="6">The objective of this course is to provide engineering students an exposure to the basic concepts of entrepreneurship and management, with a specific focus on the process of turning an idea into a commercially viable venture.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">At the end of the course, the students will learn how to
Understand the market competition
Prepare a business case for the product/Idea</td></tr>
<tr><td>Contents of the Course</td><td colspan="6">Module1: Introduction
Division of labor and creation of value
Evolution of organizations, industries and sectors, for profit and non-profit
Role of Entrepreneurs and Managers in value creation
Principles of Management- Planning, Organizing, Resourcing, Directing (4)
Module2: Strategy & Planning
Understanding industry dynamics & competition (Porter's Framework)
Understanding the industry value chain and firm positioning (6)
Module3: Organizing
Typical organizational functions (R&D, Marketing & Sales, HR, Operations)
Cybernetics of organizational functions (Stafford Beer's viable systems model)
Types of organization structures (product, functional, matrix, global) (6)
Module4: Resource Management
Financial management (Sources of funding, how to read a P&L, balance sheet)
Human resource management (Interviewing, compensation, motivation)
Global sourcing and supply chain management (8)
Module5: Management Information & Decision Making (4)
Module6: Legal and Regulatory environment (4)</td></tr>
<tr><td>Essential Reading</td><td colspan="6">Peter F Drucker, The Practice of Management, Harper Collins, 2006, ISBN:978-0060878979
Hentry Mintzberg, Managing, Berret-Koehler Publishers, 2009, ISBN:978-1605098746
Michael Porter, On competition: Updated and Expanded Edition, HBS, 2008, ISBN:978-1422126967
Vasanta Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, ISBN: 9788183184113.</td></tr>
<tr><td>Supplementary Reading</td><td colspan="6">Walter Isaacson, Steve Jobs, 2011, ISBN:978-1451648539
Eric Ries, The Lean Startup, Portfolio Penguin, 2011, ISBN:978-0307887894
Vineet Bajpai, Build from scratch, Jaico books, 2013, ISBN:9788184952919.</td></tr>
</table>

Course Name	Operations and Supply Chain Management	Course Code	ME3004			
Offered by Department	Mechanical Engineering	Structure(LTPC)	3	0	0	3
To be offered for	B. Tech.	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	• The course aims to provide an in-depth coverage of operations management and supply chain management. • Students will be exposed to various aspects such as production planning, forecasting, regression analysis, transportation models, topics in supply chain etc.					
Learning Outcomes	• The course woulde quip students with skills required for effective decision making and management					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	Operations Management: Introduction, Types of Production Systems, Facility location and lay out techniques. Materials Requirement Planning (MRP). (L3) Production Scheduling - Single machine, Flow shop. Work Study - Method Study- Recording Techniques – Therblig – SIMO chart. Forecasting methods – Qualitative methods, Quantitative Models – Time series forecasting models, moving averages, exponentials moothing with trend and seasonal adjustment, multi-item forecasting, Simple and multiple linear regression models (L11) Network Designin Supply Chain: Introduction to Supply chain, Role of distribution in supply chain–network design in the supply chain–models for facility location and capacity allocation–Impact of uncertainty on network design. Inventory (L10) Management in Supply Chain: Cycle inventory–multi-echelon inventory–safety stock in the supply chain–safety level estimation, supply uncertainty, data aggregation, replenishment policies, managing safety, inventory in practice–product availability–optimal level, affecting factors, supply chain contracts. (L13) Transportation in Supply Chain: Design options for Transportation network, trade-offs, Risk management in Transportation. (L5)					
Essential Reading	1. S.L.Davi, K. Philip and S.L.Edith, Designing and Managing the Supply Chain, TataMcGraw-Hill,2003. 2. R.Panneerselvam, Production and operations management, Prentice-HallofIndia,2010					
Supplementary Reading	1. A. Ravi Ravindran , Operations Research and Management Science Handbook, 1st Edition., 2007 by CRC Press					

Course Name	Robotics and Automation	Course Code	ME3005			
Offered by Department	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	B. Tech.	Status	Core			
Pre-requisite	NIL	Approved In	Senate-44			
Learning Objectives	To introduce the students to various state of art automation technologies in manufacturing and the role of robots in automation.					
Learning Outcomes	At the end of the course, a student will be able to • Design robots with application in manufacturing automation. • Automate a manufacturing system with various sensors, actuators and controllers.					
Contents of the course*(With approximate break up of hours)*	**Automation Systems-Overview:** Overview of mechatronic and automation systems and devices, automated feeding, transfer, retrieval mechanisms and devices, AGVs, FMS workstations, material handling and storage systems, overview of sensors, transducers, control systems and microfluidic devices in automation. (7 L) **Robots in Automation:** Robot classification and anatomy, forward and inverse kinematics, DH matrix transformation, Jacobian and differential motion, Trajectory planning, Static and dynamic analysis, Grippers and other hardware, Vision systems, Mobile and parallel robots. (15 L) **Pneumatic Systems:** Production, distribution and conditioning of compressed air, system components and graphic representations, design of pneumatic circuits. (7 L) **Hydraulic Systems:** Hydraulic systems: flow, pressure and direction control valves, actuators, supporting and control elements, pumps, servo valves and actuators, proportional valves and their applications, design of hydraulic and performance analysis. (7 L) **Controllers:** Types, Force feedback, Visitation-assisted robot control, Programming and PLC interfacing, IoT enabling. (7 L)					
Essential Reading	1. Anthony Esposito, Fluid power with applications, 7th Edn., 2014, Prentice Hall. 2. M P. Groover, Industrial Robotics: Technology, Programming and Applications, McGraw-Hill, 2nd Edn., 2012, ISBN: 9780070265097. 3. Craig J.J., "Introduction to Robotics: Mechanics and Control ", Prentice Hall, 4th Edn, 2017, ISBN: 978-0201543612.					
Supplementary Reading	1. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 4th edition, Pearson India, 2015. ISBN: 9788131732533. 2. HMT Ltd., Mechatronics, Tata–Mcgraw Hill, 2000, ISBN: 9780074636435. 3. Deb, S. R., Robotics technology and flexible automation, Tata McGraw-Hill, 2nd Edn. 2017. 4. Boucher, T. O., Computer automation in manufacturing - an Introduction, Chapman and Hall, 2013. 5. Morris A. Cohen and Uday M. Apte, Manufacturing Automation, McGraw Hill, New York, 1997, ISBN 0-256- 14606-3.					

Course Name	Quality Engineering	Course Code	ME3006			
Offered by Department	Mechanical Engineering	Structure(LTPC)	2	0	2	3
To be offered for	B. Tech.	Course Type	Core			
Prerequisite	NIL	Approved In	Senate-44			
Learning Objectives	To impart knowledge on inspection, measurement, quality control, validation and certification of products.					
Learning Outcomes	At the end of the course, a student will be able to: • Understand various metrology principles and techniques • Identify and select suitable techniques and equipment's to inspect and to ensure product quality • Know about various quality control methodologies, standards and certifications					
Course Contents(with approximate breakup of hours for lecture/tutorial/ practice)	**Basic concepts:** Measurement and inspection; Role of metrology in quality assurance; Errors; Length standards; Gauges and comparators; Linear and angular measurements; Fits and tolerances. (7 L+8 P) **Measurement Practices:** Optical metrology and laser interferometers; Measurement of flatness, straightness and form errors; Surface finish measurements; CMM; Vision applications in Metrology; Nano-measurements. (8 L+8 P) **Statistical Methodologies:** Graphical methods, Statistical control charts, Regression analysis, Analysis of variance, Sampling and acceptance. (10L+8P) **Case studies:** Inspection and Validation practices adopted in various industries. (3 L+4 P)					
Essential Reading	1. T.G.Beck with, R.D.Marangoni and J.H.Lienhard, Mechanical Measurements, 6th edition, Pearson Higher Education, 2007, ISBN: 0132296071. 2. R.K.Jain, Engineering Metrology, Khanna Publishers, 20th Reprint, 2014, ISBN:817409153X.					
Supplementary Reading	1. D.J.White house, Hand book of surface and nano metrology, 2nd Edition, CRC Press, 2010, ISBN: 9781420082012. 2. G. T. Smith, Industrial Metrology, Springer, 2002, ISBN: 9781852335076. 3. A.M.Badadhe, Metrology and Quality Control, Technical Publications, 2006, ISBN:8189411861. 4. R.C.Gupta, Statistical Quality Control, 8th edition, Khanna Publishers, 2008, ISBN: 8174091114.					

Course Name	Robotics and Automation Practice	Course Code	ME3007			
Offered by Department	Mechanical Engineering	Structure (LTPC)	0	0	2	1
To be offered for	B. Tech.	Course Type	Core			
Pre-requisite	NIL-	Approved In	Senate-44			
Learning Objectives	To introduce the students to various state of art automation technologies in manufacturing and the role of robots in automation.					
Learning Outcomes	At the end of the course, a student will be able to • Design robots with application in manufacturing automation. • Automate a manufacturing system with various sensors, actuators and controllers.					
Contents of the course(With approximate break up of hours)	Integration of various sensors, actuators, vision systems and other mechatronic devices in automation Computer based design, simulation and robot analysis Design, development and implementation of pneumatic and hydraulic circuits Programming and integration of PLCs, controllers and IoT devices in automation					
Essential Readings	1. Anthony Esposito, Fluid power with applications, 7th Edn., 2014, Prentice Hall. 2. M P. Groover, Industrial Robotics: Technology, Programming and Applications, McGraw-Hill, 2nd Edn., 2012, ISBN: 9780070265097. 3. Craig J.J., "Introduction to Robotics: Mechanics and Control ", Prentice Hall, 4thEdn, 2017, ISBN: 978-0201543612.					
Supplementary Readings	1. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 4th edition, Pearson India, 2015. ISBN: 9788131732533. 2. HMT Ltd., Mechatronics, Tata–Mcgraw Hill, 2000, ISBN: 9780074636435.Deb, S. R., Robotics technology and flexible automation, Tata McGraw-Hill, 2ndEdn. 2017. 3. Boucher, T. O., Computer automation in manufacturing - an Introduction, Chapman and Hall, 2013. 4. Morris A. Cohen and Uday M. Apte, Manufacturing Automation, McGraw Hill, New York, 1997, ISBN 0-256- 14606-3. 5. Ashitava Ghoshal, "Robotics Fundamental Concepts & Analysis", Oxford University Press; 2006, ISBN: 9780195673913 6. K. S. Fu, Robotics: control, sensing, vision and intelligence, Mcgraw-Hill,1987.					

<table>
<tr><td>Course Name</td><td>Prototyping & Testing</td><td>Course Code</td><td colspan="4">DS3001</td></tr>
<tr><td>Offered by Department</td><td>SIDI</td><td>Structure (LTPC)</td><td>1</td><td>2</td><td>0</td><td>3</td></tr>
<tr><td>To be offered for</td><td>B.Tech</td><td>Course Type</td><td colspan="4">Elective</td></tr>
<tr><td>Prerequisite</td><td>NIL</td><td>Approved In</td><td colspan="4">Senate-43</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">The objective of the course is to help students develop rapid prototyping skills and realize a minimum viable product</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">• Students will develop skills in rapid prototyping; project management and focusing on delivering outcomes</td></tr>
<tr><td>Course Contents (with approximate breakup of hours for lecture/tutorial/ practice)</td><td colspan="6">1. Minimum viable product plan(3hours)
• Markets and Needs
• Business Goals
• Key features
2. Core Product Architecture(6hours)
• Story boarding of the product core.
• Frame work for mechanical, electronics and computing paradigm
3. Design for Manufacture & Assembly(3hours)
• Manufacturing Process: Form
• Assembly constraints: Fit
4. Developing the Proof of Concept(30hours)
• Build
• Assemble
• Iterate
• Validate
• Pitch
Evaluation: Continuous assessment (80%); Final PoC demo (20%)
2 one-day hackathons may be organized during this period (one weekends) to accelerate PoC development</td></tr>
<tr><td>Essential & Supplementary Readings</td><td colspan="6">1. How to Solve Big Problems and Test New Ideas in Just Five Days by Jake Knapp, John Zeratsky, Braden Kowitz
2. The Total Inventors Manual: Transform Your Idea into a Top-Selling Product by Sean Michael Ragan
3. Prototyping and Model making for Product Design by Bjarki Hallgrimsson
Bringing a Hardware Product to Market: Navigating the Wild Ride from Concept to Mass Production by Elaine Chen</td></tr>
</table>

<table>
<tr><td>Course Name</td><td>Professional Communication</td><td>Course Code</td><td colspan="4">HS3000</td></tr>
<tr><td>Offered by Department</td><td>SH-English</td><td>Structure (LTPC)</td><td>1</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>To be offered for</td><td>B.Tech.</td><td>Course Type</td><td colspan="4">Core</td></tr>
<tr><td>Prerequisite</td><td>NIL</td><td>Approved In</td><td colspan="4">Senate-44</td></tr>
<tr><td>Learning Objectives</td><td colspan="6">• Develop the capability to apply for a job and participate in selection process
• Acquire interview skills
• Gain proficiency in language skills indispensable for a successful professional
• Develop emotional intelligence</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">• Prepare résumé and cover letter
• Ready to perform at different levels of the interview process
• Able to use interpersonal skills in challenging situations
• Competent to draft various documents for specific purposes</td></tr>
<tr><td>Course Contents (with approximate breakup of hours for lecture/tutorial/ practice)</td><td colspan="6">• Preparing cover letter, résumé, digital profile; video profile; Email etiquette (L2, P4)
• Interview skills, Group discussion and impromptu speech (L2, P6)
• Social communication skills (L4, P6)
➢ Conversational English appropriateness, context based speaking in general situations, discussion and associated vocabulary in professional situations)
➢ Non-verbal communication – relevance and effective use of paralinguistic features – body language, chronemics, haptics, proxemics
➢ Emotional intelligence (EI) and social intelligence at workplace – theoretical perspectives and their application in relevant workplace situations – EI and leadership skills – assessments and best practices in organizations
• Conflict management and communication at workplace (L4, P6)
➢ Cross-cultural communication, Argumentation, negotiation, persuasion, decision making, case study of challenging situations
➢ Organizing a meeting, working as part of a team, briefing
➢ Business presentations – Preparing effective presentations, delivering presentations and handling questions
• Writing proposals, statement of purpose, research article, agreements, summary Proofreading (L1, P4)
• Training for proficiency assessment (L1,P2)</td></tr>
<tr><td>Essential & Supplementary Reading</td><td colspan="6">1. Tebeaux, Elizabeth, and Sam Dragga. The Essentials of Technical Communication. OUP, 2018.
2. Sabin, William A. The Gregg Reference Manual: A Manual of Style, Grammar, Usage, and Formatting. McGraw-Hill, 2011, pp 408-421.
3. Raman, Meenakshi and Sangeeta Sharma. Technical Communication: Principles and Practice. OUP, 2015.
4. Caruso, David R. and Peter Salovey. The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership. John Wiley and Sons, 2004.
5. https://learnenglish.britishcouncil.org/business-english/youre-hired/episode-01
6. https://www.youtube.com/watch?v=HAnw168huqA
7. https://www.youtube.com/watch?v=azrqlQ_SLW8
8. https://owl.purdue.edu/owl/purdue_owl.html
9. Turabian, Kate L. Student's Guide to Writing College Papers. University of Chicago Press, 2010.</td></tr>
</table>

Mandatory Non-Credit Course: NCC / NSO / SSG

NCC / NSO / SSG Activities details:

The first-year students should choose any one of the above compulsory activities NSO – National Sports Organization / NCC – National Cadet Corps / SSG – Social Service Group. These are Pass/Fail Courses and receive no credits.

An option form (the google form) will be circulated to all the first-year students to choose any one course (NSO / NCC / SSG) based on their interest.

NCC – National Cadet Corps: -

This is a unique scheme offered by the government to all institutions and our institute is allotted with 52 seats across all programmes. As of now, a maximum 19 seats are reserved for the first-year students and allotment will be allotted on an assessment and fitness test. The girls are also encouraged to participate in NCC. The NCC Selection Trails with following physical fitness test will be conducted.

Test 1: 1600 M Running for Boys / 1200 M Running for Girls

Test 2: 100 M Running for Boys & Girls

Test 3: 30 Push Ups for Boys / 90 Sec Plank for Girls

Test 4: 30 Sit-Ups for Boys / 20 Sit-Ups for Girls

Test 5: 30 Squad for Boys / 25 Squad for Girls

The selected students with waitlist will be included in the merit list and the same will be submitted to NCC Office for further processing assessment.

In each Category 5 standby will be also allowed till the final NCC online enrollment is completed. If any merit list students could not clear NCC parade, then the opportunity will be extended to standby students. Those who opt for NCC and fail to clear the assessment shall be considered for NSO/SSG.

Continuous Assessment: As per the NCC act there will be 30 parade per semester for 6 semesters. After 2 years of training, they will be eligible for B Certificate examination. And on completion of 3rd year they can appear for C certificate examination. All the NCC Cadets should attend 2 Mandatory camps (8-10 days) to become eligible for the certificate examination, one each in B Certificate and the C Certificate. There are some national camps such as Trekking, Leadership, EBSB and TSC, etc wherein some slots are reserved for IIITDM students and selection will be done by the Commanding Officer of our NCC Battalion.

Certificate examination consist of Theory and practical exam. The maximum mark for the examination will be 350 (225 marks for theory and 125 for practical). The exams will be conducted in the month of February (mostly last week) every year.

NSO – National Sports Organization: -

The duration of NSO is 1 year, there will be 25 sessions per semester for 2 semesters. The selection trails will be conducted, those who are not fit will be recommended to join SSG.

The Selection Trails:
Test 1: 1200 M Run for Boys / 800 M Run for Girls
Test 2: 20 Push Ups for Boys / 60 Sec Plank for Girls
Test 3: 25 Sit-Ups Ups for Boys / 20 Sit-Ups for Girls
Continuous Assessment: A student is expected to maintain 85 % attendance of weekly classes to become eligible for final Evaluation Test.
Test 1: 1200 M Run for Boys below 7 Mins 30 Secs.
800 M Run for Girls below 6 Mins.

Test 2: 90 Sec. Push Ups for Boys – Min 25
Min 60 Secs Plank for Girls

Test 3: 90 Sec. Sit Ups for Boys – Min 30
60 Sec. Sit Ups for Girls – Min 20

Test 4: 100 M not more than 16 Sec. for Boys
100 M not more than 18 Sec. for Girls

Based on the attendance and performance in the evaluation test the result (Pass/Fail) will be declared. The selection Trails and evaluation test will be conducted by Sr. PTI along with Sports Secretaries. The NSO Fitness session will be conducted by Sr. PTI. The schedule for NSO Session will be as follows

Slot 1:	Monday & Wednesday
Time:	6.15 PM to 7.00 PM
Duration:	45 Minutes
Batch:	A, B & C

Slot 2:	Tuesday & Thursday
Time:	6.15 PM to 7.00 PM
Duration:	45 Minutes
Batch:	D, E & F

After every session attendance will be taken and updated in the google sheets. The 85% attendance is mandatory to appear in the final evaluation test.

Social Service Group (SSG)

IIITDM Kancheepuram social service group is dedicated to improving the well-being and quality of life of people. This group works towards creating a sustainable, connected, compassionate, and thriving society through its various initiatives and activities.

SSG Introduction Session:

Introduce the first-year volunteers of SSG with the workings/various activities of the club.

Introduction (9th January 2023)

List of Activities:

1. **Plant Watering Session:**

   Engaging in plant watering encourages individuals to develop an awareness of the importance of water conservation and responsible resource management. It highlights the need to use water efficiently and avoid wastage, promoting a more environmentally conscious mindset. By nurturing plants and green spaces, individuals contribute to a more sustainable, connected, and thriving society.

Plant watering activity session (22nd January 2023). An activity where our social servants watered trees and plants of our entire campus.

2. Cleanliness Drive

A cleanliness drive is a collective effort to promote cleanliness, hygiene, and the responsible disposal of waste in a particular area or community. The impact of cleanliness drives extends beyond the immediate physical environment. They foster a sense of pride, civic responsibility, and community spirit, creating a cleaner and healthier society for everyone. By promoting cleanliness and hygiene practices, these drives contribute to the overall well-being and quality of life of individuals and communities.

Cleanliness Drive- I and II (5th February & 15th April 2023). Volunteers cleaned the entire campus in the early morning. Total of 12 full size dustbins were filled with garbage

3. **Blood Donation Camp**

A blood donation camp is a specially organized event by IIITDM SSG Group where individuals voluntarily donate their blood to help those in need. The objectives of a blood donation camp include raising awareness, encouraging voluntary and safe donation, Engaging the community and identifying potential donors. Participating in a blood donation camp provides individuals with an opportunity to make a direct and tangible impact on the lives of others. It is a selfless act that promotes community well-being, compassion, and solidarity.

Blood Donation Camp (with coordination of SAC 2022-23) - 22nd February 2023

Huge numbers of our students, faculty, and staff participated in the blood donation

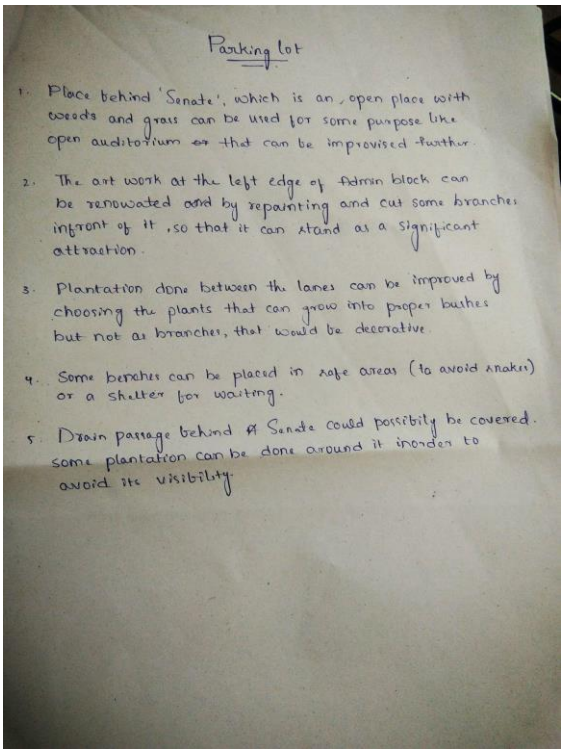
4. **Best Out of Waste**

The "Best Out of Waste" activity is a creative and environmentally friendly initiative that encourages individuals to repurpose and transform waste materials into useful or decorative items. The objective of this activity is to promote recycling, waste reduction, and the utilization of discarded materials in innovative and artistic ways. This activity not only reduces waste but also fosters innovation and appreciation for sustainable practices.

Best out of Waste activity: (Offline + Online) - 8th April 2023. Volunteers used their creativity to make useful items from waste matter.

5. **Campus Observation activity**

The campus observation activity involves exploring and observing various aspects of your campus environment. It encourages you to pay attention to the details, understand the dynamics of our campus, and gain insights into the community and facilities available. The campus observation activity provides an opportunity to develop a deeper understanding of your campus environment and engage with the community. Through this activity, you can contribute to making your campus a better place for yourself and others.


Parking lot

1. Place behind 'Senate', which is an open place with weeds and grass can be used for some purpose like open auditorium or that can be improvised further.
2. The art work at the left edge of Admin block can be renovated and by repainting and cut some branches infront of it, so that it can stand as a significant attraction.
3. Plantation done between the lanes can be improved by choosing the plants that can grow into proper bushes but not as branches, that would be decorative.
4. Some benches can be placed in safe areas (to avoid snakes) or a shelter for waiting.
5. Drain passage behind of Senate could possibly be covered. some plantation can be done around it inorder to avoid its visibility.

IIITDM campus observation activity (22nd April 2023). Volunteers surveyed our entire campus and gave reports on things that can be improved in our campus.

The SSG will also conduct various activities and initiatives apart from the above. The IIITDM Kancheepuram Social Service Group can expand its scope of activities and effectively address the specific needs of the community.

Assessment of the Activities:

The duration of SSG is 1 year, there will be 20 sessions (40 hours) per semester for 2 semesters. The schedule for SSG Session is given below.

SSG Timings: Saturday: 6 am to 8 am (2 hours per session)

After every session attendance will be taken and updated in the google sheets. 85% attendance is mandatory for getting a pass in SSG.