COURSE CURRICULUM

MECHANICAL ENGINEERING FOR 2018 BATCH- V SEMESTER

Course Code	Course Name	Course Structure			
		L	**T**	**P**	**Total Credits**
HS 301	HSS elective – I (Philosophy)	3	0	0	6
HS 303	HSS elective – I (Introduction To Literature)				
ME 301	Heat Transfer	2	1	0	6
ME 303	Kinematics and Dynamics of Machines	3	1	0	8
ME 305	Manufacturing Processes II	2	1	0	6
				Total Credits	**26**

2018 Batch (SEMESTER V)

Name of Academic Unit: Humanities and Social Sciences
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	HS 303 Introduction to Literature
ii	**Credit Structure (L-T-P-C)**	(3-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	What is Literature, Genres of Literature, Literary Texts and Contexts, Major Themes in Literature
viii	**Texts/ References**	*Glossary of Literary Terms* by MH Abrams, *The Norton Anthology of Poetry* edited by Margaret Ferguson, *Animal Farm* by George Orwell, *The Penguin Book of Modern Indian Short Stories*- Stephen Alter, *Oxford Book of English Short Stories Reissue* Edition (English, Paperback, A. S. BYATT), *Three Theban Plays: Antigone; Oedipus the King; Oedipus at Colonus* (English, Paperback, Sophocles)
ix	**Name(s) of Instructor(s)**	Prof. Ridhima Tewari
xii	**Justification/ Need for introducing the course**	The course is aimed at introducing students to literature- its reading and appreciation, and its relation to contemporary world, knowledge systems and contexts.

Name of Academic Unit: Humanities and Social Sciences
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	HS 301: Philosophy
ii	**Credit Structure (L-T-P-C)**	3-0-0-6
iii	**Type of Course**	Core – Humanities
iv	**Semester in which normally to be offered**	1
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – specify course number(s)**	None
vii	**Course Content**	1. What is Philosophy? (Philosophy in India and West) 2. Main Branches of Philosophy 3. Three Laws of Thought 4. Epistemology and Logic (Indian and Western) 5. Metaphysics (Universal and Particular, Substance and Attributes, Causality, Space, Time, Soul, God, Freedom) 6. Three Great Greek Philosophers: Socrates, Plato and Aristotle 7. Modern Philosophy: Rationalism and Empiricism (Descartes, Locke, Berkeley and Hume) 8. Ethics (Utilitarianism, Categorical Imperative of Kant, Ethical Relativism, Bio-Medical Ethics, Ethical Issues) 9. Indian Philosophy Component (Nishkama-karma of Gita, Virtue Ethics of Buddhism, Advaita Vedanta). 10. Meaning of Life.
viii	**Texts/References**	1. Ganeri, Jonardon, *Philosophy in Classical India: An Introduction and Analysis* (London: Routledge, 2001). 2. Maritain, Jacques, *An Introduction of Philosophy* (New York and Oxford: Rowman & Littlefield, 2005). 3. Mohanty, J. N. *Classical Indian Philosophy: An Introductory Text* (New York and Oxford: Rowman & Littlefield, 2000). 4. Nagel, Thomas, *What Does It All Mean? A Short Introduction to Philosophy* (Oxford: Oxford University Press, 2004). 5. Russel, Bertrand, *The Problems of Philosophy* (Oxford: Oxford University Press, Reprint by Kalpaz Publication, 2017). 6. Sharma, Chandradhar, *A Critical Survey of Indian Philosophy* (Delhi: Motilal Banarsidass, 2016). 7. Thilly, Frank, *A History of Philosophy* (New Delhi: SBW Publishers, 2018).

		8. Williams, Bernard, *Morality: An Introduction to Ethics* (Cambridge: Cambridge University Press, 2012).
ix	**Name(s) of Instructor(s)**	C. D. Sebastian
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	All
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	HS 301 is a unique course that aims to provide the BTech students an understanding of philosophy and history of ideas. Through this course they are expected to develop philosophical analysis and critical thinking which will enhance their engineering imagination as a skill and profession with the training in epistemology, logic, philosophical speculation and creativity. The ethics-module of the course will help them to think and act ethically in their profession with relation to the societal expectations of their fellow humans in India.

Name of Academic Unit: Mechanical Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	ME 301 Heat Transfer
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	**Introduction**: Typical heat transfer situations, Modes of heat transfer, Introduction to laws, some heat transfer parameters **Conduction**: Fourier's law and thermal conductivity, Differential equation of heat conduction, boundary conditions and initial conditions, Simple one dimensional steady state situations – plane wall, cylinder, sphere (simple and complex situations), concept of thermal resistance, concept of U, critical radius. variable thermal conductivity (exercise), Special one dimensional steady state situations: heat generation, pin fins, Other fin configurations (exercise), Two dimensional steady state situations, Transient conduction, Lumped capacitance model, One dimensional transient problems: analytical solutions, 1D Heisler charts, Product solutions, Numerical methods in conduction, Steady state 1D and 2D problems, 1D transient problems: Explicit and implicit **Radiation**: Basic ideas, spectrum, basic definitions, Laws of radiation, black body radiation, Planck's law, Stefan Boltzman law, Wien's Displacement law, Lambert cosine law, Radiation exchange between black surfaces, shape factor, Radiation exchange between gray surfaces – Radiosity-Irradiation method, Parallel plates, Enclosures (non-participating gas), Gas radiation **Forced Convection**: Concepts of fluid mechanics, Differential equation of heat convection, Laminar flow heat transfer in circular pipe: constant heat flux and constant wall temperature, thermal entrance region, Turbulent flow heat transfer in circular pipe, pipes of other cross sections, Heat transfer in laminar flow and turbulent flow over a flat plate, Reynolds analogy, Flow across a cylinder and sphere, flow across banks of tubes, impinging jets **Natural Convection**: Introduction, governing equations, Vertical plate – Pohlhausen solution, horizontal cylinder, horizontal plate, enclosed spaces
		Heat Exchangers: Types of heat exchangers, LMTD approach – parallel, counter-flow, multi-pass and cross

		flow heat exchanger, NTU approach: parallel, counter-flow, shell and tube, cross flow heat exchanger **Condensation and Boiling**: Dimensionless parameters, boiling modes, correlations, forced convection boiling, laminar film condensation on a vertical plate, turbulent film condensation **Mass Transfer**: Analogy between heat and mass transfer, mass diffusion, Fick's law of diffusion, boundary conditions, steady mass diffusion through a wall, transient mass diffusion, mass convection, limitations of heat and mass transfer analogy.
viii	**Texts/References**	1. Incropera FP and Dewitt DP, Fundamentals of Heat and Mass Transfer, 5th e, John Wiley & Sons, 2010. 2. Cengel YA, Heat and Mass Transfer - A Practical Approach, Third edition, McGraw-Hill, 2010. 3. Holman JP, Heat Transfer, McGraw-Hill, 1997.
ix	**Name(s) of Instructor(s)**	SVP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental and core course which is essential for appreciating the modes of heat transfer essential for functionality of the mechanical equipment.

Name of Academic Unit: Mechanical Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	ME 303 Kinematics and Dynamics of Machines
ii	**Credit Structure (L-T-P-C)**	(3-1-0-8)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Engineering Mechanics (ME 201)
vii	**Course Content**	Introduction to Mechanisms. Position, velocity and acceleration analysis. Design of Cam Follower Mechanisms. Gear tooth profiles, spur gears and helical gears. Epicyclic Gear Trains. Dynamic Analysis of Mechanisms. Balancing. Analysis and Applications of Discrete and Continuous System Vibration.
viii	**Texts/References**	1. B. Paul, Kinematics and Dynamics of Planar Mechanisms, Prentice Hall, 1979. 2. J.J. Uicker, G.R. Pennock, and J.E. Shigley, Theory of Machines and Mechanisms (3rd edition), Oxford University Press, New York, 2005. 3. S.S. Rattan, Theory of Machines (2nd edition), Tata McGraw Hill, New Delhi, 2005. 4. R.L. Norton, Design of Machinery (3rd edition), Tata McGraw Hill, New Delhi, 2005. 5. F.S. Tse, I.E. Morse, and R.T. Hinkle, Mechanical Vibrations, CBS Publishers and Distributors, 1983. 6. J.S. Rao, and K. Gupta, Introductory Course on Vibrations, Wiley Eastern, 1984. 7. J.P. Den Hartog, Mechanical Vibrations, McGraw Hill, 1956.
ix	**Name(s) of Instructor(s)**	SD
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Nil
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	--

Name of Academic Unit: Mechanical Engineering
Level: B.Tech.
Programme: B.Tech.

I	**Title of the course**	ME 305 Manufacturing Processes II
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Material Removal Processes: Mechanics of Machining, tool geometry and materials, chip formation, tool temperature, tool wear, tool life, surface finish, machinability. Optimization of machining processes. Machine Tools: Generation of surfaces by machining, basic operations on shaping, slotting and planning machines, lathe, drilling and boring machines and grinding machines. Process Parameters and setups. Production Machines: Capstan and turret lathes, automats, broaching machines, centreless grinding machines. Special purpose machines for thread cutting and gear cutting (hobbing and shaping). Finishing processes honing, laping burnishing and deburring. Introduction to modern machining processes: EDM, ECM, LASER, Jigs and fixtures, principles of location and clamping, synthesis of simple jigs and fixtures. Principles of assembly engineering, theory of dimensional chains, fully interchangeable and selective assembly. Introduction to Numerical Control.
viii	**Texts/References**	1. G. Boothroyd and W. A. Knight, Fundamentals of Machining and Machine Tools, Marcel Dekker, 1989. 2. A. Ghosh and A. K. Mallik, Manufacturing Science, Affiliated East West Press, 1985. HMT, Production Technology, Tata McGraw Hill, 1980. 3. J. Mcgeough, Advanced Methods of Machining, Chapman and Hall, 1988. 4. M. F. Spotts, Dimensioning and Tolerancing for Quality Productions, Prentice Hall, 1983.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Nil
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	