B.TECH. PROGRAMME

MECHANICAL ENGINEERING

CURRICULUM

for 2015 admissions onwards

GENERAL INFORMATION

Code Numbering:

Each course is assigned an 8-character Code number. The first two digits indicate the year of curriculum revision. The next three letters indicate the Department offering the course. The last three digits are unique to the course – the first digit indicates the level of the course (100, 200, 300, 400 etc.); the second digit indicates the type of the course, viz. 0, 1 and 2 indicate the core courses; 3,4,5,6 and 7 indicate the Elective courses; 8 indicates the Lab. or practical-based courses and 9 indicates Projects.

ABBREVIATIONS USED IN THE CURRICULUM:

Cat. - Category;
L - Lecture;
T - Tutorial;
P - Practicals;
Cr - Credits;
ES - Exam Slot;
ENGG. - Engineering Sciences (including General, Core and Electives);
HUM - Humanities (including Languages and others);
SCI - Basic Sciences (including Mathematics);
PRJ - Project Work (including Seminars).

Departments

AES - Aerospace Engineering;
CHE - Chemical Engineering;
CHY - Chemistry;
CSE - Computer Science and Engineering;
CUL - Cultural Education;
CVL - Civil Engineering;
ECE - Electronics and Communication Engineering;
EEE - Electrical and Electronics Engineering;
EIE - Electronics and Instrumentation Engineering;
HUM - Humanities and Languages;
MAT - Mathematics;
MEC - Mechanical Engineering;
PHY - Physics;
SWK - Social Work.

Category-wise distribution of credits for B Tech Mechanical Engineering programme:

Humanities - 22 credits; Basic Sciences - 24 credits;
Engineering Sciences - 111 credits; Project Work - 12 credits. **Total = 169 Credits**

Semester I

Cat.	Code	Course Title	L-T-P	Cr	ES
HUM	15ENG111	Communicative English	2 0 2	3	A
SCI	15MAT111	Calculus and Matrix Algebra	2 1 0	3	B
ENGG	15CSE100	Computational Thinking and Problem Solving	3 0 2	4	D
SCI	15PHY100/ 15CHY100	Physics / Chemistry	3 0 0	3	C
SCI	15PHY181/ 15CHY181	Physics Lab. / Chemistry Lab.	0 0 2	1	L1
ENGG	15MEC180/ 15EEE180	Workshop A/ Workshop B	0 0 2	1	L2
ENGG	15MEC100	Engineering Drawing - CAD	2 0 2	3	E
HUM	15CUL101	Cultural Education I	2 0 0	2	F
			Total	**20**	

Semester II

Cat.	Code	Course Title	L-T-P	Cr	ES
SCI	15MAT121	Vector Calculus and Ordinary Differential Equations	3 1 0	4	B
SCI	15CHY100/ 15PHY100	Chemistry/ Physics	3 0 0	3	C
ENGG	15CSE102	Computer Programming	3 0 0	3	D
ENGG	15MEC101	Engineering Drawing - CAD II	2 0 2	3	A
ENGG	15MEC102	Engineering Mechanics	3 0 0	3	E
SCI	15CHY181/ 15PHY181	Chemistry Lab. / Physics Lab.	0 0 2	1	L1
ENGG	15EEE180/ 15MEC180	Workshop B/ Workshop A	0 0 2	1	L2
ENGG	15CSE180	Computer Programming Lab.	0 0 2	1	L3
HUM	15CUL111	Cultural Education II	2 0 0	2	F
			Total	**21**	

Semester III

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC201	Engineering Thermodynamics	3 0 0	3	A
ENGG	15MEC202	Machine Drawing	2 0 2	3	C
ENGG	15MEC203	Material Science and Metallurgy	3 0 0	3	D
ENGG	15MEC204	Mechanics of Solids	3 0 0	3	E
ENGG	15EEE205	Electrical and Electronics Engineering	3 0 2	4	G
SCI	15MAT204	Transforms and Partial Differential Equations	2 1 0	3	B
HUM		Humanities Elective I		2	H
ENGG	15MEC281	Material Testing and Metallurgy Lab.	0 0 2	1	L1
HUM	15AVP201	Amrita Values Programme I	1 0 0	1	F
			Total	**23**	

Semester IV

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC211	Fluid Mechanics and Machinery	4 0 0	4	A
ENGG	15MEC212	Kinematics of Machines	3 0 2	4	C
ENGG	15MEC213	Manufacturing Process I	3 0 0	3	D
SCI	15MAT214	Probability and Statistics	2 1 0	3	B
ENGG		Elective I*	3 0 0	3	E
HUM		Humanities Elective II		2	H
ENGG	15MEC285	Fluid Mechanics and Machines Lab.	0 0 2	1	L1
HUM	15SSK221	Soft Skills I	1 0 2	2	G
HUM	15AVP211	Amrita Values Programme II	1 0 0	1	F
			Total	**23**	

Semester V

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC301	Design of Machine Elements I	3 0 0	3	A
ENGG	15MEC302	Dynamics of Machines	3 0 0	3	C
ENGG	15MEC303	Heat Power Engineering	3 0 0	3	D
ENGG	15MEC304	Manufacturing Process II	3 0 0	3	F
SCI	15MAT302	Numerical Methods	2 0 2	3	B
ENGG		Elective II*	3 0 0	3	E
ENGG	15MEC381	Manufacturing Process Lab.	0 0 2	1	L1
ENGG	15MEC382	Thermal Science Lab.	0 0 2	1	L2
HUM	15SSK321	Soft Skills II	1 0 2	2	G
ENGG	15MEC390	Live-in-Lab**		[3]	P2
			Total	**22 [+3]**	

Semester VI

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC311	Design of Machine Elements II	3 1 0	4	A
ENGG	15MEC312	Heat Transfer	3 1 0	4	B
ENGG	15MEC313	Introduction to Finite Element Methods	3 0 2	4	C
ENGG	15MEC314	Metrology and Measurements	3 0 0	3	D
ENGG		Elective III*	3 0 0	3	E
ENGG	15MEC385	Heat Transfer and Thermal Analysis Lab.	0 0 2	1	L1
ENGG	15MEC386	Metrology and Measurements Lab.	0 0 2	1	L2
HUM	15SSK331	Soft Skills III	1 0 2	2	G
			Total	**22**	

* A maximum of One Elective course can be chosen from the Electives prescribed for other Branches or from under Science Electives.

** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

Semester VII

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC401	Advanced Fluid Mechanics	3 0 0	3	A
ENGG	15MEC402	Control Engineering	3 0 0	3	B
ENGG	15MEC403	Industrial Robotics	3 0 0	3	C
ENGG	15MEC404	Mechanical Vibrations	3 0 0	3	F
HUM	15ENV300	Environmental Science and Sustainability	3 0 0	3	D
ENGG		Elective IV*	3 0 0	3	E
ENGG	15MEC481	Computer Integrated Manufacturing Lab.	0 0 2	1	L1
ENGG	15MEC482	Machine Dynamics and Control Lab.	0 0 2	1	L2
PRJ	15MEC495	Project Phase I		2	P1
ENGG	15MEC490	Live-in-Lab**		[3]	P2
			Total	**22 [+3]**	

Semester VIII

Cat.	Code	Course Title	L-T-P	Cr	ES
ENGG	15MEC411	Operations Research	3 0 0	3	A
ENGG		Elective V*	3 0 0	3	E
PRJ	15MEC499	Project Phase II		10	P
			Total	**16**	
			TOTAL	**169**	

* A maximum of One Elective course can be chosen from the Electives prescribed for other Branches or from under Science Electives.

** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

ELECTIVES

DESIGN STREAM

15MEC230	Aircraft Systems and Engineering
15MEC231	Automotive Chassis Design
15MEC232	Automotive Technology
15MEC233	Condition Monitoring and Diagnostic Maintenance
15MEC234	Design for Manufacture and Assembly
15MEC235	Fracture Mechanics
15MEC236	Materials Selection in Mechanical Design
15MEC237	Mechatronics
15MEC238	Micro-Electro Mechanical Systems
15MEC239	Modelling and Simulation of Engineering Systems
15MEC240	Optimization Techniques in Engineering
15MEC241	Pressure Vessel Design
15MEC242	Theory of Elasticity
15MEC243	Tool Design

THERMAL STREAM

15MEC246	Automotive Electronics
15MEC247	Combustion Engineering
15MEC248	Computational Fluid Dynamics
15MEC249	Design of Thermal Systems
15MEC250	Fluid Power Drives and Controls
15MEC251	Fundamentals of Nuclear Engineering
15MEC252	Gas Dynamics and Jet Propulsion
15MEC253	Internal Combustion Engines and Pollution Control
15MEC254	Petroleum Refinery Engineering
15MEC255	Power Plant Engineering
15MEC256	Refrigeration and Air Conditioning
15MEC257	Renewable Sources of Energy
15MEC258	Turbomachinery

MANUFACTURING STREAM

15MEC261	Advanced Casting Technology
15MEC262	Advanced Manufacturing Processes
15MEC263	Advanced Materials and Processes
15MEC264	Advanced Metrology and Sensing Systems
15MEC265	Advanced Welding Technology
15MEC266	CNC Machines
15MEC267	Composite Materials and Processing
15MEC268	Metal Forming Technology
15MEC269	Micro-manufacturing
15MEC270	Modern Practices in Product Design and Manufacture
15MEC271	Non-Destructive Testing
15MEC272	Product Cost Estimation
15MEC273	Quality Control and Reliability Engineering
15MEC274	Simulation, Modelling of Manufacturing Systems

MANAGEMENT

15MEC331	Engineering Economic Analysis
15MEC332	Enterprise Management
15MEC333	Financial Management
15MEC334	Industrial Engineering
15MEC335	Lean Manufacturing
15MEC336	Managerial Statistics
15MEC337	Marketing Management
15MEC338	Operations Management
15MEC339	Project Management
15MEC340	Supply Chain Management
15MEC341	Total Quality Management

SCIENCE ELECTIVES (3 0 0 3)

15CHY231	Advanced Polymer Chemistry
15CHY232	Biomaterials Science
15CHY233	Catalytic Chemistry
15CHY234	Chemistry of Advanced Materials
15CHY235	Chemistry of Engineering Materials
15CHY236	Chemistry of Nanomaterials
15CHY237	Chemistry of Toxicology
15CHY238	Colloidal and Interfacial Chemistry
15CHY239	Computational Chemistry and Molecular Modelling
15CHY241	Electrochemical Energy Systems and Processes
15CHY242	Environmental Chemistry
15CHY243	Fuels and Combustion
15CHY244	Green Chemistry and Technology
15CHY245	Instrumental Methods of Analysis
15CHY246	Medicinal Organic Chemistry
15CHY247	Modern Polymer Composites
15CHY248	Organic Reaction Mechanisms
15CHY249	Organic Synthesis and Stereochemistry
15CHY250	Polymer Materials and Properties
15CHY251	Polymers for Electronics
15CHY252	Solid State Chemistry
15CHY331	Batteries and Fuel Cells
15CHY332	Corrosion Science
15PHY230	Advanced Classical Dynamics
15PHY233	Biophysics and Biomaterials
15PHY234	Introduction to Computational Physics
15PHY238	Electrical Engineering Materials
15PHY239	Electromagnetic Fields and Waves
15PHY240	Electronic Material Sciences
15PHY241	Lasers in Material Processing

15PHY243	Microelectronic Fabrication
15PHY245	Nuclear Energy – Principles and Applications
15PHY247	Photovoltaics
15PHY248	Physics of Lasers and Applications
15PHY250	Quantum Physics and Applications
15PHY251	Thin Film Physics
15PHY331	Astronomy
15PHY333	Concepts of Nanophysics and Nanotechnology
15PHY335	Medical Physics
15PHY338	Physics of Semiconductor Devices
15PHY532	Astrophysics
15PHY535	Earth's Atmosphere
15PHY536	Earth's Structure and Evolution
15PHY540	Nonlinear Dynamics
15PHY542	Optoelectronic Devices

HUMANITIES ELECTIVES

15CUL230	Achieving Excellence in Life - An Indian Perspective	2 0 0 2
15CUL231	Excellence in Daily Life	2 0 0 2
15CUL232	Exploring Science and Technology in Ancient India	2 0 0 2
15CUL233	Yoga Psychology	2 0 0 2
15ENG230	Business Communication	1 0 2 2
15ENG231	Indian Thought through English	1 0 2 2
15ENG232	Insights into Life through English Literature	1 0 2 2
15ENG233	Technical Communication	1 0 2 2
15ENG234	Indian Short Stories in English	1 0 2 2
15FRE230	Proficiency in French Language (Lower)	1 0 2 2
15FRE231	Proficiency in French Language (Higher)	1 0 2 2
15GER230	German for Beginners I	1 0 2 2
15GER231	German for Beginners II	1 0 2 2
15GER232	Proficiency in German Language (Lower)	1 0 2 2

15GER233	Proficiency in German Language (Higher)	1 0 2 2
15HIN101	Hindi I	1 0 2 2
15HIN111	Hindi II	1 0 2 2
15HUM230	Emotional Intelligence	2 0 0 2
15HUM231	Glimpses into the Indian Mind - the Growth of Modern India	2 0 0 2
15HUM232	Glimpses of Eternal India	2 0 0 2
15HUM233	Glimpses of Indian Economy and Polity	2 0 0 2
15HUM234	Health and Lifestyle	1 0 2 2
15HUM235	Indian Classics for the Twenty-first Century	2 0 0 2
15HUM236	Introduction to India Studies	2 0 0 2
15HUM237	Introduction to Sanskrit Language and Literature	2 0 0 2
15HUM238	National Service Scheme	2 0 0 2
15HUM239	Psychology for Effective Living	2 0 0 2
15HUM240	Psychology for Engineers	2 0 0 2
15HUM241	Science and Society - An Indian Perspective	2 0 0 2
15HUM242	The Message of Bhagwad Gita	2 0 0 2
15HUM243	The Message of the Upanishads	2 0 0 2
15HUM244	Understanding Science of Food and Nutrition	1 0 2 2
15JAP230	Proficiency in Japanese Language (Lower)	1 0 2 2
15JAP231	Proficiency in Japanese Language (Higher)	1 0 2 2
15KAN101	Kannada I	1 0 2 2
15KAN111	Kannada II	1 0 2 2
15MAL101	Malayalam I	1 0 2 2
15MAL111	Malayalam II	1 0 2 2
15SAN101	Sanskrit I	1 0 2 2
15SAN111	Sanskrit II	1 0 2 2
15SWK230	Corporate Social Responsibility	2 0 0 2
15SWK231	Workplace Mental Health	2 0 0 2
15TAM101	Tamil I	1 0 2 2
15TAM111	Tamil II	1 0 2 2