Rajiv Gandhi University of Knowledge Technologies
Andhra Pradesh

(*established through Act 18 of 2008, Government of Andhra Pradesh*)

COURSE STRUCTURE AND DETAILED SYLLABI

OF B. TECH PROGRAM

IN

MECHANICAL ENGINEERING

(*Effective from 2020-2021 batch onwards*)

DEPARTMENT OF MECHANICAL ENGINEERING

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

Andhra Pradesh

Nuzvid Campus :: RK Valley Campus :: Srikakulam Campus :: Ongole Campus

CONTENTS

		Metal Cutting and Machine Tools
		Metal Cutting and Machine Tools Lab
		Fluid Mechanics and Hydraulic Machinery Lab
		Heat Transfer
		Design of Transmission Elements
		Applied Thermodynamics
		Metrology and Mechanical Measurements
		Metrology and Mechanical Measurements Lab
		Heat Transfer Lab
		Applied Thermodynamics Lab
		Operations Research
		Finite Element Method
		Managerial Economics and Financial Analysis
		Computer Aided Modeling and Simulation Lab
	(vi)	**Professional Elective Courses**
		Mechanical Vibrations
		Tribology
		Advanced Mechanics of Solids
		Theory of Plates & Shells
		Rotor Dynamics
		Vehicle Dynamics
		Bio Mechanics
		Design Optimization
		Mechanics of Composite Materials
		Control Systems & Engineering
		Design for Manufacturability
		Micro Electro Mechanical Systems
		System identification & condition monitoring
		CAD/CAM
		Product Design and Development
		Power Plant Engineering
		Advanced Fluid Mechanics
		Advanced Heat Transfer
		Computational Fluid Dynamics
		Design of Heat Exchangers
		Design and Optimization of Thermal Systems
		Turbo Machinery
		Gas Dynamics and Jet Propulsion
		Fuels and Combustion
		Energy Conservation and Management
		Cryogenics

		Advanced IC Engines
		Renewable Energy Resources
		Nuclear Power Generation & Safety
		Automobile Engineering
		Industrial Automation
		Soft Computing
		Advanced Materials Technology
		Welding Technology
		Advanced Manufacturing Processes
		Additive Manufacturing
		Advanced Metal Forming
		Non Destructive Testing
		Computer Aided Automation & Manufacturing
		Surface Engineering
		Inspection and Quality Control
		CNC Machining
		Flexible Manufacturing System
		Mechatronics
		Nanotechnology
		Robotics and Applications
		Production Operations and Management
		Entrepreneur Resources Planning
		Advanced Operations Research
		Business Management and Development
		Supply Chain Management
		Industrial Engineering and Management
		Refrigeration and Air Conditioning
		Open Elective Courses offered by Mechanical Engineering Dept.
		Electro Mechanical Systems Engineering
		Nanomaterials
		Industrial Robotics
		Management Science and Productivity
		Automotive Engineering
		Total Quality Management and Reliability
	(vii)	**Seminars/Mini Projects/Projects**
		Summer Internship
		Project-I
		Project-II
	(viii)	**Courses Offered to Other Departments**
		Workshop (For Civil and Chemical Engineering)
		Engineering and Solid Mechanics (For Chemical Engineering)

		Mechanical Technology (For Chemical Engineering)
		Engineering Mechanics (For Metallurgy & Materials Engineering)
		Workshop Manufacturing Practices (For Metallurgy & Materials Engineering)
		Engineering Graphics and Computer Drafting (For Computer Science & Engineering)
	(ix)	**Courses for Minor Degree in Mechanical Engineering**
		Basic Mechanical Engineering
		Computer Aided Design and Analysis
		Production and Operations Management
		Mechanical Design
		Product Design and Development
		Manufacturing Processes Lab
		Computer Aided Modeling and Simulation Lab
	(x)	**Courses for Minor degree in Renewable Energy Resources**
		Introduction to thermal sciences (for non-ME)
		Advanced thermal sciences (for ME)
		Solar energy
		Geothermal and Bio-mass energy
		Wind and Tidal energy
		Non-conventional energy sources Lab
		Energy economics and management
		Mini project
	(xi)	**Course for Minor degree in Robotics and Drone Technology**
		Introduction to robotics
		Mechanics of robots
		Control of robotic systems
		Introduction to drones
		Dynamics and control of drones
		Drone lab
		Robotics lab

Chapter-1

General, Course structure, Theme and semester-wise credit distribution

A. Definition of Credit:

1 Hour Lecture (L) per week	1 credit
1 Hour Tutorial (T) per week	1 credit
3 Hours Practical (Lab)/week	1.5 credits

B. Total number of credits: 160

C. Minimum number of contact hours/weeks per semester: 15 weeks of teaching

i. For 1 credit course: 15 contact hours per semester
ii. For 2 credit course: 30 contact hours per semester
iii. For 3 credit course: 45 contact hours per semester
iv. For 4 credit course: 60 contact hours per semester

D. Course code and definition, Abbreviations

Course code	Definitions
L	LECTURE
T	TUTORIAL
P	PRACTICAL
ME	CORE COURSES
BSC	BASIC SCIENCE COURSES
ESC	ENGINEERING SCIENCE COURSES
HSC	SOCIAL SCIENCES AND MANAGEMENT COURSES
PCC	PROFESSIONAL CORE COURSES
PEC	PROFESSIONAL ELECTIVE COURSES
OEC	OPEN ELECTIVE COURSES
MC	MANDATORY COURSE
SI	SUMMER INTERNSHIP
PROJ	MINI PROJECT/PROJECT

E. Structure of Program

S. No	Category	Break up of credits
1	Basic Science Courses	**23.5**
2	Engineering Science Courses	**22.5**
3	Humanities and Social Sciences including Management courses	**8.5**
4	Professional core courses	**66.0**
5	Professional Elective courses	**12.0**
6	Open Elective courses	**12.0**
7	Project work and internship in industry or elsewhere	**13.5**
8	Mandatory courses	**2.0**
	Grand Total	**160**

F. Semester-wise Credits Distribution

COURSE CODE	E1 - SEM1	E1 - SEM2	E2 - SEM1	E2 - SEM2	E3 - SEM1	E3 - SEM2	E4 - SEM1	E4 - SEM2	SUMMER INTERNSHIP	CREDITS
BSC	12.5	4	4	3	0	0	0	0	**0**	**23.5**
ESC	7	15.5	0	0	0	0	0	0	**0**	**22.5**
HSC	2.5	0	0	0	1.5	4.5	0	0	**0**	**8.5**
MC	0	0	0	0	0	0	0	2	**0**	**2**
PCC	0	0	18	19	19.5	9.5	0	0	**0**	**66**
PEC	0	0	0	0	0	6	3	3	**0**	**12**
OEC	0	0	0	0	0	0	6	6	**0**	**12**
PROJECT	0	0	0	0	0	0	4.5	6	**3**	**13.5**
Total Credits	**22**	**19.5**	**22**	**22**	**21**	**20**	**13.5**	**17**	**3**	**160**

Notations:

E1- SEM1: First Year Engineering First Semester

E1- SEM2: First Year Engineering Second Semester

E2 - SEM1: Second Year Engineering First Semester

E2 – SEM2: Second Year Engineering Second Semester

E3 - SEM1: Third Year Engineering First Semester

E3 - SEM2: Third Year Engineering Second Semester

E4 - SEM1: Fourth Year Engineering First Semester

E4 - SEM2: Fourth Year Engineering Second Semester

SUMMER INTERNSHIP: Summer Internship Program

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES
(Constituted under the Act 18 of 2008)
NUZVID*RK VALLEY***SRIKAKULAM***ONGOLE**
B. TECH. MECHANICAL ENGINEERING COURSE STRUCTURE & SYLLABUS

Semester Wise Structure of Curriculum

COURSE STRUCTURE
Mandatory Induction Program

3 Weeks Duration
Physical activity Creative Arts Universal Human Values Literary Proficiency Modules Lectures by Eminent people Visit to local areas Familiarization of Dept./Branch Innovations

I Year – SEMESTER – I

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MA1101	BSC	Differential Equations and Multivariable Calculus	**3-1-0**	**4**
20EG1181	HSC	English Language Communication Skills Lab-I	**1-0-3**	**2.5**
20PY1102	BSC	Engineering Physics	**3-1-0**	**4**
20EE1109	ESC	Basic Electrical and Electronics Engineering	**3-1-0**	**4**
20CY1103	BSC	Engineering Chemistry	**3-0-0**	**3**
20ME1181	ESC	Workshop Practice	**0-0-3**	**1.5**
20EC1189	ESC	Basic Electrical & Electronics Engineering Lab	**0-0-3**	**1.5**
20BS1183	BSC	Engineering Physics & Chemistry Lab	**0-0-3**	**1.5**
		Total credits		**22**

I Year – SEMESTER – II

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MA1201	BSC	Mathematical Methods	**3-1-0**	**4**
20ME1213	ESC	Engineering Mechanics	**3-1-0**	**4**
20ME1201	ESC	Material Science & Metallurgy	**3-0-0**	**3**
20CS1208	ESC	Programming and Data Structures	**3-0-0**	**3**
20ME1214	ESC	Engineering Graphics and Computer Drafting	**1-0-3**	**2.5**
20CS1288	ESC	Programming and Data Structures Lab	**0-0-3**	**1.5**
20ME1281	ESC	Material Science and Metallurgy Lab	**0-0-3**	**1.5**
20BE1201	MC	Environmental Science	**2-0-0**	**0**
			Total Credits	**19.5**

II Year – SEMESTER – I

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MA2103	BSC	Transform Calculus	**3-1-0**	**4**
20ME2101	PCC	Kinematics of Machinery	**3-1-0**	**4**
20ME2102	PCC	Thermodynamics	**3-1-0**	**4**
20ME2103	PCC	Mechanics of Solids	**3-1-0**	**4**
20ME2104	PCC	Manufacturing Processes	**3-0-0**	**3**
20ME2181	PCC	Mechanics of Solids Lab	**0-0-3**	**1.5**
20ME2105	PCC	Computer Aided Machine Drawing	**0-0-3**	**1.5**
			Total Credits	**22**

II Year – SEMESTER – II

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20ME2201	PCC	Design of Machine Elements	**3-1-0**	**4**
20ME2202	PCC	Dynamics of Machinery	**3-1-0**	**4**
20ME2203	PCC	Fluid Mechanics & Hydraulic Machinery	**3-1-0**	**4**
20ME2204	PCC	Metal Cutting and Machine Tools	**3-1-0**	**4**
20MA2201	BSC	Probability and Statistics	**3-0-0**	**3**
20ME2281	PCC	Metal cutting and Machine Tools Lab	**0-0-3**	**1.5**
20ME2282	PCC	Fluid Mechanics & Hydraulic Machinery Lab	**0-0-3**	**1.5**
20HS2201	MC	Indian Constitution	**2-0-0**	**0**
			Total Credits	**22**

III Year – SEMESTER – I

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20ME3101	PCC	Heat Transfer	**3-1-0**	**4**
20ME3102	PCC	Design of Transmission Elements	**3-1-0**	**4**
20ME3103	PCC	Applied Thermodynamics	**3-1-0**	**4**
20ME3104	PCC	Metrology and Mechanical Measurements	**3-0-0**	**3**
20ME3181	PCC	Metrology and Mechanical Measurements Lab	**0-0-3**	**1.5**
20ME3182	PCC	Heat Transfer Lab	**0-0-3**	**1.5**
20ME3183	PCC	Applied Thermodynamics Lab	**0-0-3**	**1.5**
20EG3182	HSC	English Language Communication Skills Lab-II	**0-0-3**	**1.5**
			Total Credits	**21**

III Year – SEMESTER – II

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20ME3201	PCC	Operations Research	**3-1-0**	**4**
20ME3202	PCC	Finite Element Method	**3-1-0**	**4**
20BM3201	HSC	Managerial Economics and Financial Analysis	**3-0-0**	**3**
20ME32XX	PEC	Program Elective Course-1	**3-0-0**	**3**
20ME32XX	PEC	Program Elective Course-2	**3-0-0**	**3**
20ME3281	PCC	Computer Aided Modeling and Simulation Lab	**0-0-3**	**1.5**
20EG3283	HSC	English Language Communication Skills Lab-III	**0-0-3**	**1.5**
			Sub Total Credits	**20**
20ME3291	**Summer Internship**			**3**
			Total Credits	**23**

IV Year – SEMESTER – I

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20ME41XX	PEC	Program Elective Course-3	**3-0-0**	**3**
20XX41XX	OEC	Open Elective Course-1	**3-0-0**	**3**

20XX41XX	OEC	Open Elective Course-2	**3-0-0**	**3**
20ME4192	PROJ-1	Project	**0-0-9**	**4.5**
			Total Credits	**13.5**

IV Year – SEMESTER – II

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20ME42XX	PEC	Program Elective Course-4	**3-0-0**	**3**
20XX42XX	OEC	Open Elective Course-3	**3-0-0**	**3**
20XX42XX	OEC	Open Elective Course-4	**3-0-0**	**3**
20ME42XX	MC	Community Service	**0-0-0**	**2**
20ME4293	PROJ-2	Project	**0-0-12**	**6**
			Total Credits	**17**

LIST OF PROFESSIONAL ELECTIVE

COURSES (PEC) DESIGN STREAM

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MEXX21	PEC	Mechanical Vibrations	3-0-0	3
20MEXX22	PEC	Tribology	3-0-0	3
20MEXX23	PEC	Advanced Mechanics of Solids	3-0-0	3
20MEXX24	PEC	Theory of Plates & Shells	3-0-0	3
20MEXX25	PEC	Rotor Dynamics	3-0-0	3
20MEXX26	PEC	Vehicle Dynamics	3-0-0	3
20MEXX27	PEC	Bio Mechanics	3-0-0	3
20MEXX28	PEC	Design Optimization	3-0-0	3
20MEXX29	PEC	Mechanics of Composite Materials	3-0-0	3
20MEXX30	PEC	Control Systems & Engineering	3-0-0	3
20MEXX31	PEC	Design for Manufacturability	3-0-0	3
20MEXX32	PEC	Micro Electro Mechanical Systems	3-0-0	3
20MEXX33	PEC	System Identification & Condition Monitoring	3-0-0	3
20MEXX34	PEC	CAD/CAM	3-0-0	3
20MEXX35	PEC	Product Design and Development	3-0-0	3

THERMAL STREAM

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MEXX36	PEC	Power Plant Engineering	3-0-0	3
20MEXX37	PEC	Advanced Fluid Mechanics	3-0-0	3
20MEXX38	PEC	Advanced Heat Transfer	3-0-0	3

20MEXX39	PEC	Computational Fluid Dynamics	3-0-0	3
20MEXX40	PEC	Design of Heat Exchangers	3-0-0	3
20MEXX41	PEC	Design and Optimization of Thermal Systems	3-0-0	3
20MEXX42	PEC	Turbo Machinery	3-0-0	3
20MEXX43	PEC	Gas Dynamics and Jet Propulsion	3-0-0	3
20MEXX44	PEC	Fuels and Combustion	3-0-0	3
20MEXX45	PEC	Energy Conservation and Management	3-0-0	3
20MEXX46	PEC	Cryogenics	3-0-0	3
20MEXX47	PEC	Advanced IC Engines	3-0-0	3
20MEXX48	PEC	Renewable Energy Resources	3-0-0	3
20MEXX49	PEC	Nuclear Power Generation & Safety	3-0-0	3
20MEXX50	PEC	Automobile Engineering	3-0-0	3
20MEXX73	PEC	Refrigeration & Air Conditioning	3-0-0	3

MANUFACTURING STREAM

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MEXX51	PEC	Industrial Automation	3-0-0	3
20MEXX52	PEC	Soft Computing	3-0-0	3
20MEXX53	PEC	Advanced Materials Technology	3-0-0	3
20MEXX54	PEC	Welding Technology	3-0-0	3
20MEXX55	PEC	Advanced Manufacturing Processes	3-0-0	3
20MEXX56	PEC	Additive Manufacturing	3-0-0	3
20MEXX57	PEC	Advanced Metal Forming	3-0-0	3
20MEXX58	PEC	Non Destructive Testing	3-0-0	3
20MEXX59	PEC	Computer Aided Automation & Manufacturing	3-0-0	3
20MEXX60	PEC	Surface Engineering	3-0-0	3
20MEXX61	PEC	Inspection and Quality Control	3-0-0	3
20MEXX62	PEC	CNC Machining	3-0-0	3
20MEXX63	PEC	Flexible Manufacturing System	3-0-0	3
20MEXX64	PEC	Mechatronics	3-0-0	3
20MEXX65	PEC	Nanotechnology	3-0-0	3
20MEXX66	PEC	Robotics and Applications	3-0-0	3

INDUSTRIAL ENGINEERING & MANAGEMENT STREAM

Subject Code	Subject Category	Subject Name	L-T-P	Credits
20MEXX67	PEC	Production Operations & Management	3-0-0	3
20MEXX68	PEC	Entrepreneur Resources Planning	3-0-0	3
20MEXX69	PEC	Advanced Operations Research	3-0-0	3
20MEXX70	PEC	Bossiness Management and Development	3-0-0	3
20MEXX71	PEC	Supply Chain Management	3-0-0	3
20MEXX72	PEC	Industrial Engineering and Management	3-0-0	3

LIST OF OPEN ELECTIVE COURSES (OEC) OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING TO OTHER DEPARTMENTS

OPEN TO ALL BRANCHES				
Subject Code	**Subject Category**	**Subject Name**	**L-T-P**	**Credits**
20MEXX15	OEC	Electro Mechanical Systems Engineering	3-0-0	3
20MEXX16	OEC	Nanomaterials	3-0-0	3
20MEXX17	OEC	Industrial Robotics	3-0-0	3
20MEXX18	OEC	Management Science and Productivity	3-0-0	3
20MEXX19	OEC	Automotive Engineering	3-0-0	3
20MEXX20	OEC	Total Quality Management and Reliability	3-0-0	3
Courses offered by Mechanical Engineering Department to other departments				
For CIVIL AND CHEMICAL ENGINEERING				
20MEXY85	ESC	Workshop	0-0-3	1.5
FOR CHEMICAL ENGINEERING				
20ME1111	ESC	Engineering and Solid Mechanics	3-0-0	3
20ME2112	ESC	Mechanical Technology	3-0-0	3
FOR METALLURGICAL & MATERIALS ENGINEERING				
20ME1113	ESC	Engineering Mechanics	2 -1-0	3
20ME1186	ESC	Workshop Manufacturing Practices	0-0-3	1.5
FOR COMPUTER SCIENCE AND ENGINEERING				
20ME1114	ESC	Engineering Graphics and Computer Drafting	1-0-3	2.5

MINOR DEGREE IN MECHANICAL ENGINEERING
COURSE STRUCTURE

S. No	Course Code	Subject Category	Name of the subject	L-T-P	Credits
1	20MEM101	PCC	Basic Mechanical Engineering	3-0-0	3
2	20MEM102	PCC	Computer Aided Design and Analysis	3-1-0	4
3	20MEM103	PCC	Production and Operations Management	3-0-0	3
4	20MEM104	PCC	Mechanical Design	3-1-0	4
5	20MEM105	PCC	Product Design and Development	3-0-0	3
6	20MEM181	PCC	Manufacturing Process Lab	0-0-3	1.5
7	20MEM182	PCC	Computer Aided Modeling and Simulation Lab	0-0-3	1.5
				Total credits	20

MINOR DEGREE IN RENEWABLE ENERGY RESOURSES
COURSE STRUCTURE

S. No	Course Code	Subject Category	Name of the subject	L-T-P	Credits
1	20MEM201	PCC	Introduction to thermal sciences (for non-ME)	3-1-0	4
			Advanced thermal sciences (for ME)		
2	20MEM202	PCC	Solar energy	3-0-0	3
3	20MEM203	PCC	Geothermal and Bio-mass energy	3-0-0	3
4	20MEM204	PCC	Wind and Tidal energy	3-0-0	3
5	20MEM281	PCC	Non-conventional energy sources Lab	0-0-3	1.5
6	20MEM205	PCC	Energy economics and management	3-1-0	4
7	20MEM291	PCC	Mini project	0-0-3	1.5
				Total credits	20

MINOR DEGREE IN
ROBOTICS AND DRONE TECHNOLOGY
COURSE STRUCTURE

S. No	Course Code	Subject Category	Name of the subject	L-T-P	Credits
1	20MEM301	PCC	Introduction to robotics	3-0-0	3
2	20MEM302	PCC	Mechanics of robots	3-1-0	4
3	20MEM303	PCC	Control of robotic systems	3-0-0	3
4	20MEM304	PCC	Introduction to drones	3-0-0	3
5	20MEM305	PCC	Dynamics and control of drones	3-1-0	4
6	20MEM381	PCC	Drone lab	0-0-3	1.5
7	20MEM382	PCC	Robotics lab	0-0-3	1.5
				Total credits	20