Nirma University, Ahmedabad

(Statutory University Established under the State Act and recognized by the University Grants Commission under section -2(f) of the UGC Act, 1956)

NIRMA UNIVERSITY
NAAC ACCREDITED 'A+' GRADE

TRANSCRIPT

The statement showing the Semester and Course wise performance of the student

Name of the Institute : Institute of Technology
Programme : B. Tech. in Mechanical Engineering **Duration :** 4 years (8 semesters)

Roll No.	Student's Name	Month & Year of Admission	Month & Year of Completion
19BME134	Shrey D Shah	July - 2019	June - 2023

Course Code & Title		CG	Cr
Semester : I			
2MA101	Linear Algebra	A+	4
2PY101	Physics	B+	4
2CL102	Environmental Studies	A	2
2CS101	Computer Programming	A+	4
2EE101	Elements of Electrical and Electronics Engineering	B+	4
2EE102	Electrical Workshop	A	1
2SP101	Design Thinking	A	-
2SP102	ICT Tools and Cyber Security	B+	-
SPI : 9.00		**Credits Earned : 19**	
Semester : II			
2MA201	Calculus and Differential Equations	B+	4
2CY101	Chemistry	B+	3
2ME101	Engineering Graphics	A	4
2HSI101	English Communication	A	3
2ME201	Introduction to Mechanical Engineering	A	1
2ME102	Mechanical Workshop	A	1
2SP103	Critical Thinking	B+	-
2SP104	Yog and Meditation	A+	-
SPI : 8.56		**Credits Earned : 16**	
PPI : 8.80		**Progressive Credits Earned : 35**	
Semester : III			
2ME301	Material Science and Engineering	A	4
2ME302	Manufacturing Processes - I	A	4
2ME303	Thermodynamics	A	3
2ME304	Theory of Machines	A	4
2ME305	Mechanics of Solids	A	3
2HS341	Principles of Management	A	2
2ME306	Introduction to Computer Aided Drafting	A+	1
2SP301	Community Services	A	-
SPI : 9.05		**Credits Earned : 21**	
PPI : 8.89		**Progressive Credits Earned : 56**	
Semester : IV			
2ME401	Metrology and Quality Control	A	4
2ME402	Fluid Mechanics and Hydraulic Machines	A	4
2ME403	Manufacturing Processes - II	A+	4
2ME404	Dynamics of Machines	A	4
2MA401	Mathematics for Mechanical Engineering	B+	3
2HS342	Principles of Economics	A	2
2ME405	Introduction to Machine Design	A	1
SPI : 9.05		**Credits Earned : 22**	
PPI : 8.94		**Progressive Credits Earned : 78**	

Course Code & Title		CG	Cr
Semester : V			
2ME501	Machine Design - I	A	4
2ME502	Automation and Control	B+	4
2ME503	Heat and Mass Transfer	A	4
2EE551	Electrical Machines	B+	1
2MEDE02	Basics of Flight and Aerodynamics	A	3
2ICOE51	Programmable Logic Controller	A	3
UEIM007	Financial Management	A	3
SPI : 8.77		**Credits Earned : 22**	
PPI : 8.90		**Progressive Credits Earned : 100**	
Semester : VI			
2ME601	Energy Systems - I	A	4
2ME602	Machine Design - II	A	3
2MEDE61	Basics of Machine Learning	A	3
2MEDE65	CNC Technology and Programming	A	3
2CSOE78	Scientific Programming	A	3
2HSOE03	Media, Culture and Society	A	3
SPI : 9.00		**Credits Earned : 19**	
PPI : 8.92		**Progressive Credits Earned : 119**	
Semester : VII			
2ME701	Manufacturing Technology and Management	B+	4
2ME702	Energy Systems - II	B	3
2MEDE19	Operations Research	A	3
2MEDE21	Rapid Prototyping	B+	3
2CLOE29	Project Management	B+	3
2CSOE54	Database Management Systems	B+	3
2ME703	Minor Project	A+	2
2ME704	Summer Internship	A+	1
SPI : 8.27		**Credits Earned : 22**	
PPI : 8.82		**Progressive Credits Earned : 141**	
Semester : VIII			
2ME801	Major Project / Internship	A+	11
SPI : 10.00		**Credits Earned : 11**	

Total Credits Earned	Cumulative Performance Index (CPI)	Equivalent % Marks	Class obtained
152	8.90/ 10	84.0	First Class with Distinction

CG = Course Grade Cr = Credit SPI = Semester Performance Index PPI = Progressive Performance Index

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Date : 06-Jun-2023

NIRMA UNIVERSITY

Deputy Registrar,
Examination

- **Medium of Instructions :** English
- **Eligibility Criteria for Admission:**
  (i) Higher Secondary Certificate Examination (10+2) or recognized examinations considered equivalent by the University passed with Chemistry, Physics and Mathematics students are admitted in the first semester of the B.Tech. programme. (ii) Diploma Examination in the concerned discipline from Technical Examination Board, Gujarat State or from the Nirma University or recognized examinations considered equivalent by the Nirma University in addition to the Secondary Certificate Examination (10^{th}) passed students are admitted in the third semester of B.Tech. programme.

THE PROVISION OF DIFFERENT RELEVANT REGULATIONS

Performance level of the student in the course

Grade (G)	Qualitative Meaning (GQ)	Equivalent Grade Point (g)	Grade (G)	Qualitative Meaning (GQ)	Equivalent Grade Point (g)
A+	Excellent	10	B	Good	7
A	Creditable	9	C+	Satisfactory	6
B+	Very Good	8	C	Average	5

PASSING STANDARDS

- Minimum passing grade for a course – 'C'
- Minimum CPI required for passing a programme – 5.00

CALCULATION OF INDICES

PIC -- Performance index for the course = Equivalent grade point (g) corresponding to the course grade

PPI = (Up to any stage under consideration)
$(i_1 c_1 + i_2 c_2 + i_3 c_3 .....) /$ (Sum of credits of all courses registered up to that stage), where, $i_1, i_2, i_3 ....$ are PIC values of credit courses passed and $c_1, c_2, c_3.....$ are the credit values of the respective courses.

SPI = This index is similar to PPI except that the stage to be considered is the end of a semester.

CPI = This index refers to the entire programme. It is calculated when the student passes the programme. The method of calculation is the same as for PPI or SPI but the summation is for the courses of all semesters of the programme.

All index values will be rounded off to the second place of decimal.

CLASS AND PERCENTAGE MARKS

CPI value, its equivalent class and formula for computing the percentage of marks from the CPI obtained by the student are given below.

CPI value	Equivalent class
5.00 To 6.49	Second
6.50 To 7.49	First
7.50 and above	First with Distinction

Percentage marks = $(CPI - 0.5) \times 10$

SYLLABUS

NIRMA UNIVERSITY

NAAC ACCREDITED 'A+' GRADE

Institute Name : **Institute of Technology**
Programme Name : **B. Tech. in Mechanical Engineering**
Roll No : **19BME134**
Student's Name : **Shrey D Shah**

Semester : I

	L	T	P	C
2MA101				
Linear Algebra	3	1	-	4

Rank and Inverse of Matrix, Solution of System of Linear Equations, Vector Space, Subspace, Basis of Vector Space, Rank Nullity Theorem, Linear Transformation, Matrix of General Linear Transformation, Change of Basis and Similarity, Eigen Values and Vectors, Caley- Hamilton Theorem, Diagonalization & Quadratic forms.

	L	T	P	C
2PY101				
Physics	2	1	2	4

Physics of Nanomaterials, Lasers and Holography, Introduction to Fiber Optics, Nuclear and Plasma Physics, Basic concepts of Plasma physics, Physics of Vacuum Techniques and Cryogenics, Engineering of Auditorium and Ultrasonics

	L	T	P	C
2CL102				
Environmental Studies	1	1	-	2

Environment and its Multidisciplinary nature, Biodiversity and its conservation, Concepts of sustainability, Environment Impact Assessment, Types of Pollution and pollutant, Causes , effects and control measures: Water, Air, Noise, Soil and Radioactive pollution; Role of individual in prevention of pollution, Solid waste management, Environmental ethics-issues and solutions, Water conservation, Environmental Protection acts.

	L	T	P	C
2CS101				
Computer Programming	2	1	2	4

Introduction to Computers, Typical C Program Development Environment and steps, Flowchart, Algorithm, Test Cases, Introduction to Programming, Data types, Decision Statements and control Structures, Arrays, Characters and Strings, Library functions and User defined functions in C, Passing Arguments by value and by reference, Pointers, Structures, File processing.

	L	T	P	C
2EE101				
Elements of Electrical and Electronics Engineering	3	-	2	4

Review of DC Circuits, Single Phase AC Circuits, Three Phase AC Circuits, Electromechanical Energy Conversion, Analog Electronics, Digital Electronics.

	L	T	P	C
2EE102				
Electrical Workshop	-	-	2	1

Wiring Techniques, Introduction to Electronic Components, Laboratory Equipment, Introduction to Electrical Components, Soldering Techniques, Basics of Household Electrical Equipment, Electrical Safety and Protection, Design of Electrical Panels, Introduction to DC Machines.

	L	T	P	C
2SP101				
Design Thinking	-	2	-	-

Defining Design Thinking and the process. Creativity Myths. Barriers and Self reflection. Ideas and tools. History of successful/unsuccesful products. Diversity and collaboration.

	L	T	P	C
2SP102				
ICT Tools and Cyber Security	2	-	-	-

Internet as a Learning tool, Search Engines, Online learning resources, Sharing and Collaboration Tools, Teaching/learning tools, Information development, and Management Tools, Information Analysis Tool, Presentation tools, Audio/video resource creation tools, Internet and Cyber Security, Attacks and prevention Zombies and Trojan Horses, Security Dangers in Browsers, Worms, and viruses.

Semester : II

	L	T	P	C
2MA201				
Calculus and Differential Equations	3	1	-	4

Calculus, Beta, Gamma function, Surface area, Volume, Infinite Series, Multivariable Calculus: Differentiation & Integration, Ordinary Differential Equations, Partial Differential Equations (First Order)

	L	T	P	C
2CY101				
Chemistry	2	-	2	3

Water and its treatment, Fuel and its analysis, Lubricants and Greases, Polymer and Polymer composites, Green Chemistry, Fullerenes, Explosives, Nano materials, Organic electronic materials, Liquid crystals, Fuel cells, Electrochemical systems and Advanced engineering materials

	L	T	P	C
2ME101				
Engineering Graphics	2	-	4	4

Importance and Applications of Engineering Drawing, Engineering curves and conic curves, Projection of points, straight lines, planes and solids, section of solids and development of surfaces, orthographic projection, isometric projection, Computer aided drafting tools

	L	T	P	C
2HSI101				
English Communication	1	1	2	3

Vocabulary Building, Writing Skills, Nature and style of writing, Communication and its types, Oral Communication, Presentation skills, Group Discussions, Persuasive Communication, Formal modes of communication, Listening Skills, Short stories, Poems.

	L	T	P	C
2ME201				
Introduction to Mechanical Engineering	1	-	-	1

Introduction to Engineering, Overview of Mechanical Engineering, Introduction to Engineering Design, Emerging Trends and interdisciplinary approach, career opportunities

	L	T	P	C
2ME102				
Mechanical Workshop	-	-	2	1

Demonstration and job preparation of Joining process, Plumbing, Fitting, Sheet Metal work, Carpentry, Blacksmithy, use of conventional and CNC machines

	L	T	P	C
2SP103				
Critical Thinking	-	2	-	-

Introduction to Thinking, Brain and Thinking, Anatomy of Brain for thinking, Rationality and its model, Fast and Slow Thinking, Objectivity, Subjectivity, Assumptions and Skepticism, Paradigm shift, Perception, Prejudice and stereotype, Attribution, Heuristics, Cognitive Biases and Errors ,Deductive and Inductive Reasoning, Forma and Informal fallacies, Arguments, Problem Solving, Case Studies.

	L	T	P	C
2SP104				
Yog and Meditation	-	-	2	-

Introduction of "YOG", Astangyog, Sukshmayog (Light exercises), Suryanamaskar, Rules for asanas (Before & After), Asanas for brain & stomach, Asanas for relaxation and rest,Kriya (Kapalbhranti and Tratak), Bhastrika, Tribandha, Ujjayi, Pranayama (Anuloma, Viloma), Omkar (Bhramari), Importance of diet for "Total Health", Meditation for mind relaxation

Semester : III

	L	T	P	C
2ME301				
Material Science and Engineering	3	-	2	4

Crystal Structures and Mechanical Properties, Phase Diagram and Theory of Alloys, Heat Treatment, Nonferrous Metals and Alloys, Ceramic, Composite and Polymeric Materials, Related Laboratory Work

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SYLLABUS

Institute Name : **Institute of Technology**
Programme Name : **B. Tech. in Mechanical Engineering**
Roll No : **19BME134**

Student's Name : **Shrey D Shah**

2ME302	L	T	P	C
Manufacturing Processes - I	3	-	2	4

Metal Casting, Metal Joining, Metal Forming, Related Laboratory Work

2ME303	L	T	P	C
Thermodynamics	3	-	-	3

Fundamental Concept, Properties of Gas and Vapour, First Law of Thermodynamics, Second Law of Thermodynamics, Entropy and Exergy, Gas and Vapour Power Cycle

2ME304	L	T	P	C
Theory of Machines	3	-	2	4

Links & Mechanism, Motion, Static Force Analysis Dynamic Force Analysis, Cams, Gear Trains, Gears, Related Laboratory Work

2ME305	L	T	P	C
Mechanics of Solids	2	1	-	3

Statics and Distributed forces, Friction, Strength and Elasticity, Stresses in beams and Shafts, Principal stresses and Theories of Failure, Related Laboratory Work

2HS341	L	T	P	C
Principles of Management	2	-	-	2

Significance of management, Evolution of Management thoughts, levels of management Planning, Organizing, Directing, Coordinating, Controlling, Budgeting , role of management Various functions of Management like Finance, Marketing, HR etc.

2ME306	L	T	P	C
Introduction to Computer Aided Drafting	-	-	2	1

Solid modelling, Assembly modelling, Drafting

2SP301	L	T	P	C
Community Services	-	-	1	-

The Student is required to offer his/her services to the NGOs/ Government Organizations for a period of three weeks during the summer vacation. The student has to prepare a report of the activities carried out and has to make presentation before a jury.

Semester : IV

2ME401	L	T	P	C
Metrology and Quality Control	3	-	2	4

Linear and Angular Measurements, Measurement and Instrumentation, Measurement of Surface Finish, Measurement of screw threads and gears, Limits, fits and gauges, Fundamental of Quality, Related Laboratory Work

2ME402	L	T	P	C
Fluid Mechanics and Hydraulic Machines	3	-	2	4

Introduction, Fluid Kinematics and Dynamics, Dimensional Analysis, Impact of Jet, Hydraulic Turbines, Pumps, Related Laboratory Work

2ME403	L	T	P	C
Manufacturing Processes - II	3	-	2	4

Machine tools and Machining Processes, Surface processing operations, Gear Manufacturing processes, Introduction to CNC machining, Introduction to additive manufacturing, Related Laboratory Work

2ME404	L	T	P	C
Dynamics of Machines	3	-	2	4

Dynamic Force Analysis, Gyroscope, Mechanical Vibration- Undamped and Damped free vibration, Forced vibration of single degree of freedom systems, Two and multi degree of freedom systems, Balancing

2MA401	L	T	P	C
Mathematics for Mechanical Engineering	2	1	-	3

Vector Differential Calculus, Vector Differential Calculus, Fourier Series, Harmonic Analysis, Laplace Transformation of the functions, Inverse Laplace Transformation, Solution of Ordinary Differential Equations using Laplace Transformation, Numerical Methods for solving Root of an Equation and 1st order Ordinary Differential Equations.

2HS342	L	T	P	C
Principles of Economics	2	-	-	2

Introduction to Economics Micro and Macro Economics, Demand Function, Supply Function, Elasticity of Demand and Elasticity of Supply, Production Function, short run production function-the law of variable proportion - Cost Function, Market and Revenue Function, Price Determination, National Income Accounting, Inflation, Money and Banking, International Trade

2ME405	L	T	P	C
Introduction to Machine Design	-	-	2	1

Shafts, Keys and Couplings, Design of Springs, Levers, Power Screws

Semester : V

2ME501	L	T	P	C
Machine Design - I	3	-	2	4

Design philosophy, Designs of welded and riveted joints, Design of machine components under fatigue loading, Design of clutches and brakes, Design of parts subjected to Buckling, Design of Pressure Vessels, Related Laboratory Work

2ME502	L	T	P	C
Automation and Control	3	-	2	4

Control system modelling, Control system analysis, Controllers, Automation systems, Sensors and Actuators, Advances in Automation Systems , Related Laboratory Work

2ME503	L	T	P	C
Heat and Mass Transfer	3	-	2	4

Conduction, Heat transfer through extended surfaces, Convection, Boiling and Condensation, Radiation, Heat Exchangers, Mass transfer, Related Laboratory Work

2EE551	L	T	P	C
Electrical Machines	-	-	2	1

DC Motors: Shunt and series motors, principle, characteristics, need of starters, speed control and selection of motor for various applications. Induction motors: Principle, types for 3 phase and single phase, its construction, motor characteristics, need of starter and various starters, speed control and electrical braking, selection of motor for various applications. Transformers: Principle, construction, types of transformer, direct & indirect testing of transformer, voltage regulation, characteristics, parallel operation of transformer. Alternators: Construction and operating principle of alternators, voltage regulation, determination of voltage regulation of alternator.

2MEDE02	L	T	P	C
Basics of Flight and Aerodynamics	3	-	-	3

Overview of Aircraft Industry and Evolution of Flight, Basics of Flight and Aircraft Systems, Principles of Aerodynamics, Flight Mechanics and Performance

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2ICOE51	L	T	P	C
Programmable Logic Controller	2	-	2	3

Introduction, PLC hardware, PLC Operation, PLC Ladder Programming, PLC Communication protocol.

UEIM007	L	T	P	C
Financial Management	3	-	-	3

BASICS OF FINANCIAL MANAGEMENT Introduction to Financial Management, Role and Functions of the Finance function, Time Value of Money, Basics of Risk and Return, FINANCIAL MARKETS AND INSTRUMENTS The Financial System, Introduction to Financial Markets and Instruments, Sources and Cost of Capital, MAJOR FINANCIAL DECISIONS, The Investment Decision, The Funding Decision, The Distribution of Profit Decision, Introduction to Working Capital Management, Managing Risk, USING SPREADSHEETS IN FINANCE, Introduction to Financial functions in Spreadsheets, Spreadsheet Application Exercises

Semester : VI

2ME601	L	T	P	C
Energy Systems - I	3	-	2	4

Refrigeration, Psychrometry and HVAC Systems, IC Engine and its Sub Systems, Compressors, Reciprocating compressor, Centrifugal compressor, Axial flow compressor, Rotary compressors, Related Laboratory Work

2ME602	L	T	P	C
Machine Design - II	3	-	-	3

Design of power transmission elements, Design of gear boxes, Design and selection of bearings, Design of IC engine components, Design of material handling devices

2MEDE61	L	T	P	C
Basics of Machine Learning	2	-	2	3

Introduction to Machine Learning, Supervised learning using linear and non linear models, Unsupervised Learning, Support Vector Machines (SVM), Application of Machine Learning in Mechanical Engineering, Related Laboratory Work

2MEDE65	L	T	P	C
CNC Technology and Programming	2	-	2	3

Introduction, Manual Part Programming of Turning Center, Manual Part Programming of Machining Center, Computer Assisted Part Programming, Related Laboratory Work

2CSOE78	L	T	P	C
Scientific Programming	2	-	2	3

Introduction to Computational Science and Applications, Programming in Python- Interpreter and its environment, Object Oriented Programming, Classes and Methods, Encapsulation, Inheritance, Array Computing and Curve Plotting, Vectors and Higher Dimensional Arrays, Matrices, numPy, sciPy and Matplotlib, Python Pandas, Scientific computation using Python

2HSOE03	L	T	P	C
Media, Culture and Society	3	-	-	3

Theories of Media, Mcdonaldisation, folk/popular practices in India, The emergence of the newspaper and print.The conflict of traditional forms and modern technology, the nation- and the home - persistent themes in Hindi cinema, the post-90s Hindi cinema imagining the family and NRI cultures, issues of modernity and development, discourse of national integration, narrative serials, commercial sponsorship, Women oriented narratives, the mythological, global and regional networks, politics after television, popular music and technology, devotional music.

Semester : VII

2ME701	L	T	P	C
Manufacturing Technology and Management	3	-	2	4

Cutting Tools and Cutting Fluids, Theory of Metal Cutting, Jigs and Fixtures, Production Planning and Control, Forecasting and Inventory Management

2ME702	L	T	P	C
Energy Systems - II	3	-	-	3

Vapour and Gas Power Cycles, Thermal and Nuclear Power Plants, Gas Turbine and Combined Cycle Power Plants, Alternative Energy Sources

2MEDE19	L	T	P	C
Operations Research	3	-	-	3

Introduction to Operation Research, Formulation and Graphical Solution, Simplex Method, Transportation Techniques, Assignment Techniques, Network Analysis for Project Management, Replacement Theory and Queuing Theory

2MEDE21	L	T	P	C
Rapid Prototyping	3	-	-	3

Introduction, CAD Modelling and Data Processing for RP, RP Systems, Rapid Tooling, Reverse Engineering, Errors in RP Processes and RP Applications

2CLOE29	L	T	P	C
Project Management	3	-	-	3

Project Selection, Project Life cycle, Project Feasibility, Cost-benefit Analysis, Performance Measurement, Project Planning and Network Techniques: CPM, PERT, Updating network, time-cost trade-off, Manpower planning, Material Management, Inventory Management, Accounting and Financial Management, Financial Statements, Balance Sheet, Ration Analysis, Total Quality Management, Occupational Health and Safety Act, Project Management Information System, Use of Software in Project Management

2CSOE54	L	T	P	C
Database Management Systems	2	-	2	3

Overview and Architecture of Database systems, Relational Databse: Concept and design, SQL Concepts, Normalization, PL/SQL and NOSQL

2ME703	L	T	P	C
Minor Project	-	-	4	2

The Student(s) shall carryout project based on one or more of the following aspects – Prototype Design, Product Preparation/ Development, Working Model, Fabrication of Set up, Laboratory Experiments, Process Modification/ Development, Simulation, Software Application/ Development, Integration of Software and Hardware, Data Analysis, Survey etc. The student is required to submit a project report based on the work carried out

2ME704	L	T	P	C
Summer Internship	-	-	-	1

The summer internship is aimed at providing opportunity to the students to gain experience in the industries / research institutes for a period of 4 to 6 weeks during break between Semester-VI and Semester-VII. During the summer internship, the students will have the exposure to industrial/ research environment which will help them to develop the competencies required for professional career, interpersonal and human relationship skills

Semester : VIII

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Roll No : **19BME134**

Student's Name : **Shrey D Shah**

2ME801	L	T	P	C
Major Project / Internship	-	-	22	11

The major project will be aligned with the aims of the engineering programme and its areas of specialization and shall be based on the recernt trends in technology, computational techniques, system/ process analysis, construction/ fabrication/ production techniques, design methodologies, analytical formulation and solution, etc, The student(s) shall carry out a comprehensive project at relevant Academic/ R&D/ Industrial organization. The aim of internship is to enable students to develop their engineering skills and practice. The students will be placed in industry/ research organization and assessed for academic credit. The internship will be aligned with the aims of the engineering program and its areas of specialization. Students are expected to experience a real-life engineering workplace and understand how their engineering and professional skills and knowledge can be utilized in industry. The student is required to submit a project/internship report based on the work carried out.

Date : 01-Jun-2023

Deputy Registrar
(Examination)

Nirma University Ahmedabad Examination Section