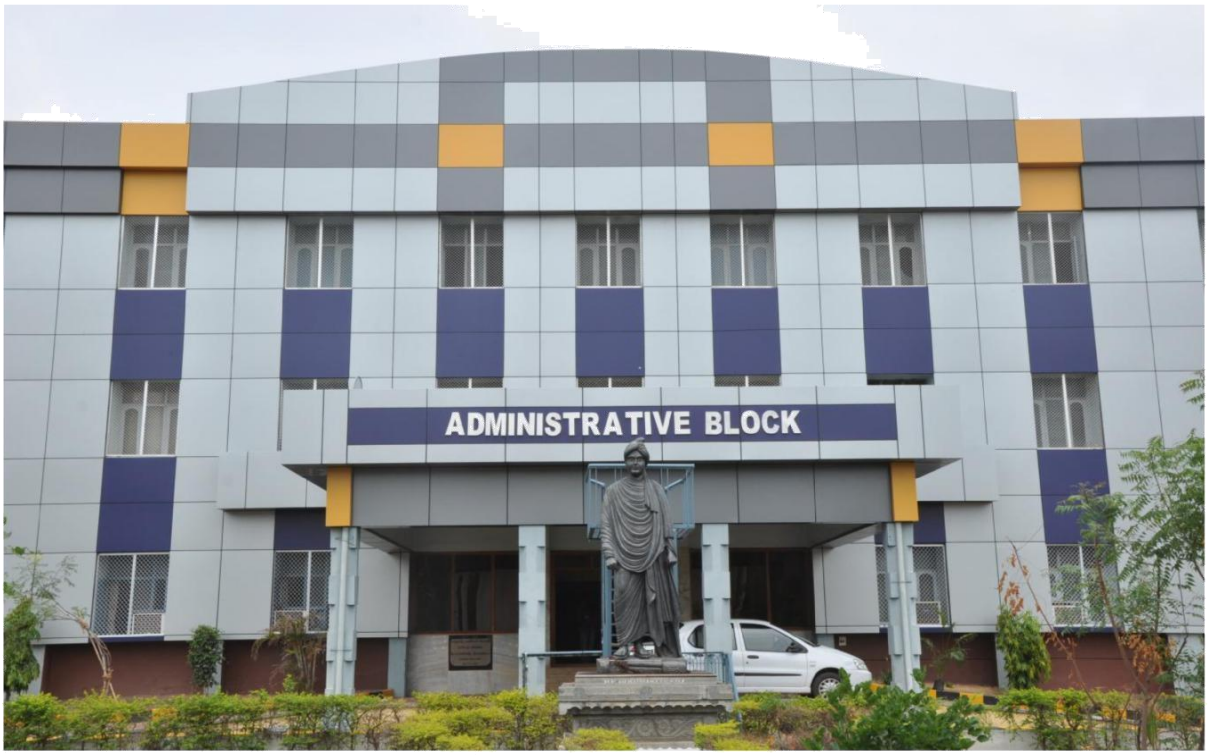

Scheme – 2020

Department of Mechanical Engineering

G. Pulla Reddy Engineering College (Autonomous): Kurnool

Accredited by NBA of AICTE and NAAC of UGC

Affiliated to JNTUA, Anantapuramu

Scheme and Syllabus for Minor of FOUR YEAR B.Tech. Degree Course in MECHANICAL ENGINEERING

(With Effect from the Batch Admitted in 2020-21)

VISION OF THE DEPARTMENT

To develop the department into a model center of education and research in the field of Mechanical Engineering and allied areas and to become a significant contributor to the development of industry and society

MISSION OF THE DEPARTMENT

M1 To impart quality technical education in emerging fields of Mechanical Engineering through balanced academic curriculum in accordance with changing industry requirements

M2 To establish centers of excellence where students can strengthen their entrepreneurial skills, technical workmanship, and research proficiency

M3 To provide opportunities/platforms for students to nurture leadership abilities, ethical values; and to enable them learn responsibility and accountability at work

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The educational objectives of the under-graduate programme in Mechanical Engineering at G. Pulla Reddy Engineering (Autonomous) Kurnool are to prepare graduates to possess the ability **PEO1** To apply a broad, fundamental-based knowledge, and up-to-date skills required in

performing professional work in Mechanical Engineering and related disciplines

PEO2 To design works pertaining to Mechanical Engineering, incorporating the use of design standards, realistic constraints and consideration of the economic, environmental, and social impact of the design

PEO3 To use modern computer software tools to solve Mechanical Engineering problems and explain and defend their solutions and communicate effectively using graphic, verbal and written techniques to all audiences and

PEO4 To become successful entrepreneur or leaders in private/governmental organizations or enter graduate programs in Mechanical Engineering and related disciplines and to pursue lifelong learning and research

PROGRAM SPECIFIC OUTCOMES (PSOs)

Mechanical Engineering Program Students will be able to

1. Understand the concepts of basic Mechanical Engineering and apply their theoretical & practical knowledge to solve problems in Thermal Engineering, Machine Design, Production Engineering and Industrial Engineering.
2. Solve engineering design and manufacturing problems, using CAD, CAE, and CAM tools, along with analytical skills to arrive at the better solutions.

PROGRAMME OUTCOMES (POS)

Mechanical Engineering Program Students will be able to

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

DEPARTMENT OF MECHANICAL ENGINEERING

Minor in Mechanical Engineering

(For Non Mechanical Engineering students)

Scheme of Instruction and Examination

S. No	Category	Course Title	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	T	P/D	End Exam Marks	CIA Marks	Total Marks
I		**Theory**							
1.	PCC	Engineering Mechanics	4	3	1		60	40	100
2.	PCC	Thermal Engineering	4	2	1	2	60	40	100
3.	PCC	Materials Technology	4	4			60	40	100
4.	PCC	Production Technology	4	2	1	2	60	40	100
5.	PCC	Fundamentals of Engineering Design	4	3	1		60	40	100
6.	PCC	Production Planning and Control	4	3	1		60	40	100
7.		MOOC – I	2						100
8.		MOOC – II / Mini Project	2						100
		Total	**20**						

Note:

1. Student can opt any 4 subjects.
2. Compulsory MOOC/NPTEL courses for 04 credits (02 courses @ 2 credits each) OR One MOOC course and Mini project @ 2 credits each
3. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
4. Minor must be completed simultaneously with a Major degree program.

ENGINEERING MECHANICS (EGM)

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME01	PCC	3	1	-	4	40	60	100
Sessional Exam Duration : 1 ½ Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course students will be able to

CO1 : Calculate the resultant of different force systems

CO2: Determine the unknown forces in determinate structures using equilibrium conditions

CO3 : Determine the axial forces in the members of determinate trusses

CO4 : Understand the concept of friction

CO5 : Determine the centroid and moment of inertia of areas Compute the stresses and strains of axially loaded members, elastic constants of different materials

UNIT - I

Forces and Force Systems

Types of force systems – Resultant of coplanar, concurrent and non concurrent force systems – Concept of moment – Varignon"s theorem.

Equilibrium of Systems of Forces

Equilibrium concept in mechanics – Free body diagram - Equilibrium of coplanar force systems

UNIT - II

Reactions in Beams

Types of loads, supports and beams – Support reactions for simply supported beams, cantilever and overhanging beams subjected to different types of loads.

Static Analysis of Simple Plane Trusses

Analysis of simple trusses by method of joints and method of sections.

UNIT - III

Friction

Introduction to Friction, Impending Motion, Ladder Friction, Friction in square threaded screws - simple screw jack. Belt Friction, friction in flat & V-belt, Ratio of tensions, Power transmission by belts.

UNIT - IV

Central Points

Concept of first moment – Definition of centroid and centre of gravity – Centroid of composite areas.

Area Moment of Inertia

Moment of inertia for areas – Parallel and perpendicular axis theorems – Moment of inertia of compound sections – Radius of gyration.

UNIT - V

Mechanics of Deformable Solids

Mechanical properties of materials –Simple stresses and strains – Types of stresses – Hooke's law – Stress– strain curve for ductile material – Factor of safety and working stress.

Relation Between Elastic Constants

State of simple shear – Complimentary shear stress – Relation between Young's modulus, Rigidity modulus, Bulk modulus and Poisson's ratio

Text Books :

1. R.K. Bansal, "*A text book of Engineering Mechanics*", Laxmi Publications
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "*Mechanics of materials*", Laxmi Publications.
3. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press.

Reference Books :

1. Thimoshenko & Young, "*Engineering Mechanics*", Tata McGraw–Hill Publications
2. Bhavikatti and Rajasekharappa, "*Engineering Mechanics*", New Age Intl. Publications
3. A.K. Tayal, "Engineering Mechanics –Statics & Dynamics", Umesh Publications
4. R.K.Rajput, "*Applied Mechanics*", Laxmi Publications.

Web Resources:

1. www.nptel.ac.in/courses

Question Paper Pattern:

Sessional Exam :

The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section.

End Examination:

The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub-questions and the student should answer any one question from each unit. Each Question carries 12 marks.

THERMAL ENGINEERING (TE)

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME02	PCC	3	1		4	40	60	100
Sessional Exam Duration : 1 ½ Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the basics of thermodynamics and working of air standard cycles.

CO2: Analyze working of IC engines and its performance.

CO3: Understand heat transfer applications and its governing laws

CO4: Understand Refrigeration and air conditioning working and its performance

CO5: Understand use of energy resources and energy auditing.

UNIT – I

Basic Concepts of Thermodynamics: Thermodynamics systems- closed, open and isolated: Thermodynamic equilibrium, thermodynamic process, thermodynamic cycles, Zeroth law of Thermodynamics and its applications, energy transfer in the form of work and heat. Reversible and irreversible cycles, air standard cycles-Carnot, Otto, Diesel and Dual cycles. P.V. and T-S diagrams

UNIT – II

IC engines : IC engine- definition-classification- Terminology, Working principle of two stroke petrol & Diesel engine, Working principle of Four stroke petrol & Diesel engine. Testing of IC engines- Brake power, Indicated power, Mechanical efficiency, indicated thermal efficiency, brake thermal efficiency.(Theoretical only)

UNIT – III

Heat Transfer : Introduction, Methods of heat transfer – Conduction, Convection and Radiation, Fourier's law of heat conduction, Newton law of cooling- Stefan-Boltzman law- Heat transfer by conduction through composite wall, Heat transfer radiation, Absorptivity, Transmissivity, Refelctivity, Emissivity, black and gray bodies.

UNIT – IV

Refrigeration& Air Conditioning: Working principle of refrigerator, Methods of refrigeration, Vapour compression refrigeration systems, Vapour absorption refrigeration system, Comparison, COP. Refrigerants – Properties and Selection.

Psychrometry: Properties of atmospheric air, Psychometric chart, Psychrometric processes, Simple air flow diagram for an Air-Conditioning system (Theoretical concepts only)

UNIT – V

Fundamentals of Energy: Classification of energy sources, common forms of energy, important of Non conventional energy sources, Energy chain, Advantages and disadvantages of conventional energy sources, Salient features of non conventional energy sources, Environmental aspects of energy, Environmental – Economy, Energy sustainable development, Energy auditing, World energy status.

LIST OF EXPERIMENTS

1. Performance Test on 4 – stroke Diesel Engine
2. Morse Test on Multi-cylinder Petrol Engine
3. Determination of Thermal conductivity of composite wall
4. Determination of Stefan – Boltzmann constant
5. Determination of heat transfer coefficient under natural convection
6. Determination of emissivity of a grey surface
7. Performance test on refrigeration tutor

Text Books

1. P.K. Nag, Engineering Thermodynamics, TMH publishers, New Delhi.
2. Mahesh M Rathore, Thermal Engineering, Mc Graw Hill Education (INDIA) Private limited New delhi.
3. B.H. Khan, Non-conventional Energy Sources, TMH publishers, New Delhi.

Reference Books

1. RK Rajput, Thermal Engineering, Lakshmi Publications, New Delhi.
2. G.D.Rai, Non-conventional Energy Sources, Khanna Publishers, New Delhi.

Web Resources:

1. http://nptel.ac.in/courses/112106141
2. https://nptel.ac.in/courses/121/106/121106014/

Question Paper Pattern:

Sessional Exam :

The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section.

End Examination:

The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub- questions and the student should answer any one question from each unit. Each Question carries 12 marks.

MATERIALS TECHNOLOGY (MT)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME03	PCC	4			4	40	60	100
Sessional Exam Duration : 1 ½ Hrs						End Exam Duration : 3 Hrs		

Course Outcomes : At the end of the course students will be able to

CO 1 :	Understand the classification of materials, deformation and failure of materials.
CO 2 :	Understand the Iron Carbide Phase Diagram and Identify Heat treatment processes to improve Mechanical properties of materials for applications in Engineering Industries.
CO 3 :	Understand the types of composites and fabrication methods of polymer matrix composites.
CO 4 :	Understand the fabrication methods of ceramic and metal matrix composites.
CO 5 :	Understand the methods for analyzing the mechanical properties and micro structures of materials.

UNIT – I

Introduction:
Classification of Materials – Metals – Ferrous & Non-ferrous, Non-metals, Polymers, Ceramics and Composites: Definition, general properties, applications with examples.

Deformation:
Classification, Types of deformations, Elastic and plastic deformations, Mechanisms of plastic deformations – Slip and Twinning.

Failures:
Definition and types of facture, Brittle fracture, Dislocation theory of fracture, Ductile fracture, fatigue failure, Creep, Stages of creep.

UNIT – II

Phase Diagrams:
Lever Rule, Phase rule. Cooling curve of pure iron, construction and interpretation of Fe-Fe_3C diagram, Effect of alloying elements on Fe-Fe_3C diagram.

Heat Treatment of Steels:
Purpose of heat treatment, different heat treatment processes, Annealing, Normalising, Hardening, and Tempering, TTT diagrams, Hardenability, determination of hardenability.

UNIT – III

Introduction to Composites:
Types of Composites- Matrix and their role – Principal types of fibre and matrix materials.

Polymer Matrix Composites
Hand layup techniques – filament winding – Pultrusion – Injections moulding – Blow moulding - Compression moulding – Reaction injection moulding.

UNIT – IV

Ceramic Matrix Composites:
Manufacturing of Ceramic Matrix Composites; Liquid Metal Infiltration – Liquid phase sintering. Processing and structure of glass, glass-ceramics, and ceramics – Processing of ceramic matrix composites - Alumina matrix composites - Carbon-carbon composites.

Metal Matrix Composites:
Manufacturing of Metal Matrix Composites – Physical vapor deposition, Diffusion bonding, Stir casting process, Squeeze casting process, Infiltration, Spray deposition process.

UNIT – V

Analysis of Materials:
Principle, Theory, Working and Application; , Universal Testing Machine , X-Ray Diffraction, Scanning Electron Microscopy, Transmission Electron Microscopy, Thermal Gravimetric Analysis, Dynamic Mechanical Analysis.

Text Books:

1. William D Callister, Material science and Engineering adopted by R. Bala Subramaniam Wiley India Pvt Ltd New Delhi.
2. V. Raghavan, Material Science and Engineering, PHI Publishers, New Delhi.
3. Sidney H. Avner, Introduction to Physical Metallurgy. TMH Publications, New Delhi.

Reference Books:

1. William F. Smith, Foundations of Material Science and Engineering, McGraw Hill, New York.
2. Donald R. Askel Pradeep P. Fulay, Essentials of Material Science Engineering, CENGAGE Learning
3. Dr. V.D. Kodgire, S.V. Kodgire, Material Science and Metallurgy, Everest Publications, New Delhi

Question Paper Pattern:

Sessional Exam :

The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section.

End Examination:
The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub- questions and the student should answer any one question from each unit. Each Question carries 12 marks.

PRODUCTION TECHNOLOGY (PT)

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME04	PCC	3	1		4	40	60	100
Sessional Exam Duration : 1 ½ Hrs						End Exam Duration: 3 Hrs		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the concepts of foundry and casting, types of casting and defects in casting

CO2: Differentiate hot working, cold working and rolling processes, Understand the principles, operations and types of forging, extrusion and drawing processes.

CO3: Understand the principles and applications of welding processes, such as gas welding, arc welding, resistance welding, thermit welding, laser beam welding, electron beam welding, soldering, brazing and braze welding.

CO4: Understand Concept of theory of metal cutting, force analysis with the help of merchants circle diagram, working of machine tools such as lathe, Milling machine, Drilling machine, Grinding machine

CO5: Classify the plastic materials (thermosetting and thermoplastic) and processing techniques of plastics and their applications, understand the concept of CNC machines.

UNIT – I

Introduction about manufacturing processes, classification of manufacturing process
Foundry : Introduction to patterns and foundry, moulding Sand, Sand testing, melting furnaces for ferrous and non-ferrous metals such as cupola and Arc furnace,
Casting: sand casting, continuous casting, investment casting, centrifugal casting, die casting, Casting defects.

UNIT – II

Plastic deformation of metals: Hot and cold working of metals
Rolling: principle, types of rolling mills,
Forging: principle, Smith Forging, Drop and Press forging, M/C forging,
Extrusion: principle, Direct, Indirect, Impact and Hydrostatic extrusion, Extrusion of tubes.
Drawing: Wire drawing and tube drawing

UNIT – III

Welding: classification of welding, gas welding, arc welding (TIG (GTAW) and MIG (GMAW) welding), resistance welding and thermit welding
Advanced Welding methods: plasma Arc, Laser Beam, Electron Beam, Ultrasonic, Brazing and soldering.

UNIT – IV

Principles of metal cutting: Classification of metal cutting operations, Nomenclature of Single point cutting tool, mechanics of metal cutting, mechanism of chip formation, types of chips, oblique and orthogonal cutting - Merchant's Theory of metal cutting, Merchant's circle diagram for forces.
Different types of machine tools for metal cutting: Lathe, Milling machine, Drilling machine, Grinding machine

UNIT – V

Processing of Plastics: Classification of plastics, thermoplastics, thermosetting plastics and applications, injection, blow molding, compression molding and Transfer Molding.

CNC Machines: Introduction to NC machines, parts of NC Machines, Introduction to CNC machines parts of CNC Machines, Deference between NC and CNC Machines.

List of Experiments

1. To find the percentage of water content and clay content in mould sand.
2. To determine the grain fineness number of sand using sieve shaker.
3. To prepare a sand mould using split piece pattern.
4. To prepare a Lap Joint Using MIG Welding.
5. To prepare a Butt Joint Using TIG Welding.
6. To prepare a butt joint using Oxy Acetylene Gas Welding.
7. Step Turning and Taper Turning on Lathe.
8. To drill a hole on Drilling machine.
9. To cut V-groove cutting on Shaper Machine.
10. Simple step Turning operation on CNC Lathe.
11. Simple Milling operation on CNC Mill.

Text Books :

1. P. C. Sharma, A Text of production Technology (Manufacturing Processes), S Chand and Company, New Delhi
2. Pakirappa, Metal Cutting And Machine Tool Engineering, Durga Publishing House
3. Pakirappa, Production Technology, Durga Publishing House

Reference Books :

1. R. K. Jain, Production Technology, Khanna Publications, New Delhi.
2. Kalpak Jian, Schmid, manufacturing processes for Engineering Materials. Pearson, New Delhi
3. Roy A. Lindberg, Processes and Materials of Manufacture, PHI Publishers, New Delhi.

Web Resources:

http://nptel.ac.in/courses/112107145/
https://nptel.ac.in/courses/112/104/112104304/
https://nptel.ac.in/courses/112/104/112104301/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section

End Examination:

The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub-questions and the student should answer any one question from each unit. Each Question carries 12 marks

FUNDAMENTALS OF ENGINEERING DESIGN (FED)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME05	PCC	3	1		4	40	60	100
Sessional Exam Duration : 1 ½ Hrs					End Exam Duration : 3 Hrs			

Course Outcomes : At the end of the course, students will be able to

CO1:	Understand the fundamentals of machine design, factor of safety, Theories of failures, selection of material and impact loads
CO2:	Design the bolted, riveted and welded joints.
CO3:	Design shafts and keys
CO4:	Design spur and helical gears.
CO5:	Design antifriction bearings, helical springs and leaf Springs.

UNIT – I

Design Principles: The art and science of machine design, types of design methods, stages in machine design, selection of materials, types of loads and factor of safety. Maximum Principal stress theory, Maximum shear stress theory, Maximum principal strain theory, Maximum strain energy theory, Maximum distortion energy theory, impact loads. Introduction to computer aided design.

UNIT – II

Joints:
Bolted Joints: Bolted joints, stresses in bolts, bolts of uniform strength, bolted joints under eccentric loading.
Riveted Joints: Types of riveted joints, modes of failure, strength and efficiency of riveted joints, pitch of the rivets, design stresses, boiler joints, diamond joints.
Welded Joints: Types of welded joints, strength of welds, Design of simple welded joints.

UNIT – III

Design of Shafts: Design of solid and hollow shaft for strength and rigidity, design of shafts for combined loads.
Keys: Types of Keys, stresses in Keys, design of rectangular, square and taper Keys.

UNIT – IV

Design of Gears: Classification of gears, design of spur gears, Lewis equation - bending strength, dynamic load and fatigue of gear tooth, Introduction to Helical gears, bevel gears and worm gears.

UNIT – V

Antifriction Bearings: Ball and roller bearings, static load, dynamic load, equivalent radial load, design and selection of ball and roller bearings.
Springs: Classification of springs, design of coiled springs of various cross section, concentric springs, leaf springs, Belleville springs

Text Books:

1. R.K. Jain, Machine Design, Khanna Publishers, New Delhi
2. V.B.Bhandari, Design of Machine Elements, TMH Publishers, New Delhi

Reference Books:

1. Schaum's series, Machine Design, TMH Publishers, New Delhi
2. Sadhu Singh, Machine Design, Khanna Publishers, New Delhi

3. Joseph E. Shigely, Mechanical Engineering Design, TMH Publishers, New Delhi
4. M.F. Spotts, Design of Machine Elements, PHI Publishers, New Delhi
5. Pandya and Shah , Machine Design, Charotar Publishers
Data Hand Book:
Mahadevan and Balaveera Reddy, Machine Design Data Hand Book, CBS Publishers, New Delhi
Question Paper Pattern:
Sessional Exam: The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section **End Examination:** The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub-questions and the student should answer any one question from each unit. Each Question carries 12 marks

PRODUCTION PLANNING & CONTROL (PPC)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	TOTAL
MME06	PCC	3	1		4	40	60	100
Sessional Exam Duration : 1 ½ Hrs					End Exam Duration : 3 Hrs			

Course Outcomes : At the end of the course, students will be able to

CO1:	Understand the overview of the production / operations management system
CO2:	Apply the forecasting techniques
CO3:	Apply aggregate planning, master scheduling and MRP techniques and solve line balancing problems
CO4:	Solve inventory related problems
CO5:	Understand the concepts of quality and its related techniques

UNIT – I

Introduction: Definition, functions of PPC, Types of production – job, batch and continuous, Product design and development, standardization, simplification, specialization, Product life cycle

UNIT – II

Forecasting: Introduction to Forecasting, Forecasting methods – Opinion and judgmental methods, Time series method, Exponential smoothing, Regression & Correlation method

UNIT – III

Aggregate Planning & Master Scheduling: Introduction, Objectives of Aggregate Planning, Costs in aggregate planning, Strategies in aggregate planning, Master Production Scheduling

Assembly line balancing – Methods of line balancing: Largest candidate rule, Kilbridge and Wester's method, and Ranked Positional Weights method

Material Requirement Planning (MRP): Importance of MRP, MRP system inputs and outputs, MRP calculations

UNIT – IV

Inventory Management: Introduction, Types of Inventories, Inventory Costs

Deterministic Inventory models: Basic EOQ model, Manufacturing model without shortages, EOQ model with planned shortages, Inventory model with price breaks, ABC analysis

UNIT – V

Quality Control : Concept of quality, evolution of quality control, assignable and chance causes of variation, Variable Control charts (averages and ranges charts) Attributes control charts (P chart and C chart),

Acceptance Sampling – Single Sampling, Double Sampling and Multiple sampling plans, OC curves of single sampling plans

Text Books:

1. Joseph G. Monks, Operations Management, TMH Publishers, New Delhi
2. M.Mahajan, Industrial Engineering and production management, Dhanpat rai and Co, New Delhi

Reference Books:

1. S.N. Chary, Operations Management, TMH Publishers, New Delhi
2. N.D. Vohra, Quantitative techniques in Management, TMH publishers, New Delhi
3. R. Panneerselvam, Production and operations management, PHI

Web Resources:

1. https://nptel.ac.in/courses/110/107/110107141/
2. https://nptel.ac.in/courses/112/107/112107143/
3. https://nptel.ac.in/courses/112/107/112107238/

Question Paper Pattern:

Sessional Exam:

The question paper for sessional examination shall be for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of three sections with Two Questions (EITHER/ OR Type) in each section. The student shall answer one question from each section

End Examination:

The question paper for End examination shall be for 60 marks. The Question paper shall contain Five Units with Two Questions (Either or Type) from each unit. Each of these questions may contain sub-questions and the student should answer any one question from each unit. Each Question carries 12 marks