Seth Jai Parkash Mukand Lal Institute of Engineering & Technology

Department of Mechanical Engineering

Student Handbook

Semester-VIIIth

January-June-2019

Bachelor of Technology (Mechanical Engineering) Kurukshetra University, Kurukshetra

*SCHEME OF STUDIES/EXAMINATIONS**(w.e.f. 2015-16 onwards)***

Semester – VIII

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	ME-402N	Automobile Engineering	4	0	0	4	75	25	0	100	3
2		DEC-III*	4	0	0	4	75	25	0	100	3
3		DEC-IV*	4	0	0	4	75	25	0	100	3
4	ME-404N	Power Plant Engineering	4	0	0	4	75	25	0	100	3
5	ME-406N	Quality Assurance & Reliability	4	0	0	4	75	25	0	100	3
6	ME-408N	Automobile Engineering Lab	0	0	2	2	0	40	60	100	3
7	ME-410N	Project-II**	0	0	10	10	0	100	100	200	3
8	ME-412N	Seminar-II	0	2	0	2	0	100	0	100	
		Total	**20**	**2**	**12**	**34**	**375**	**365**	**160**	**900**	

**The student should select two Departmental Elective Courses (DEC) from the following list.*

Course No.	DEC-III	Course No.	DEC-IV
ME-414N	Smart Materials Structures & Devices	ME-426N	Manufacturing Management
ME-416N	Lubrication Technology	ME-428N	Design of Pressure Vessels and Piping
ME-418N	Energy Management	ME-430N	Concurrent Engineering
ME-420N	Waste Heat Recovery System	ME-432N	Industrial Combustion
ME-422N	Foundry Engineering	ME-434N	Metal Forming and Finishing
ME-424N	Ergonomics in Design	ME-436N	Air Craft and Rocket Propulsion

********The project should be initiated by the students in the beginning of VIIIth semester and will be evaluated at the end of the semester on the basis of a presentation and report.* ***Note:*** *Project-II should not be related to Project-I unless it involves large amount of work, time and effort.*

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME – 402N	**AUTOMOBILE ENGINEERING**	4	0	0	75	25	100	3
Purpose	To make aware the students with the study of engineering which teaches manufacturing, and mechanical-mechanisms as well operations of automobiles. It is an introduction to vehicle engineering which deals with motorcycles, cars, buses trucks etc. It includes branch study of mechanical, electronic, and safety elements. Some of the engineering attributes and disciplines that are of importance to the automotive engineer.							
Course Outcomes								
CO1	Students will be able to Develop a strong base for understanding future developments in the automobile industry							
CO2	Students will be able to Explain the working of various parts like engine, transmission, gear box etc.							
CO3	Students will be able to Describe how the brakes and the suspension systems operate							
CO4	Students will be able to Understand the steering geometry and emission control system.							

UNIT I

Introduction: Brief history of automobiles, Main components of an automobile, Brief description of each component. Brief description of constructional details and working of a four stroke I.C. Engine (S.I. Engines and C.I. Engines) including lately developed overhead cam shaft, Multi-cylinder engines, Introduction to recent developments in I.C. Engines- Direct injection systems, Multi-point fuel injection systems, Introduction, Brief description of different components of Transmission System.

Clutch: Clutch Introduction to Clutch and its different types, Principle of Friction Clutch, Clutch Lining and friction materials used in Friction Clutches, Torque transmitted, Brief description of Cone Clutch, Single Plate and Multiplate Clutches, Dry and wet clutches, Automatic clutch action, Centrifugal clutches, Electromagnetic clutches, Fluid Flywheel.

UNIT II

Gear Box: Gear Box Air resistance, gradient resistance and rolling resistance coming across a moving automobile, Tractive effort, Variation of tractive effort with speed, Performance curves (object and need of a gear box), Sliding mesh gear box, Control mechanism, Sliding type selector mechanism, Ball type selector mechanism, Steering column gear shift control, Constant mesh gear box, Synchromesh device, Automatic transmission in general, AP automatic gear box, Torque converter, Torque converter with direct drive, Lubrication of Gear Box.

Propeller Shaft: Functions and requirements of a propeller shaft, Universal joints, Constructional forms of universal joints, Flexible-ring joints, Rubber-bushed flexible joints. Constant-velocity joints. Differential : Principle of operation, Constructional details of a typical Differential unit, Traction control differentials, Multi-plate clutch type traction control device.

UNIT III

Brakes: Functions and methods of operation, Brake efficiency. Elementary theory of shoe brake, brake shoe adjustments, A modern rear-wheel brake, Disc brakes, Brake linkages, Leverage and adjustment of the brake linkage, Servo- and power operated brakes, Vacuum brake operation,' Hydraulic Brakes-constructional details and working, Direct action vacuum servos, Power-operated brakes, A dual power air brake system,

Suspension system: Suspension principles, Road irregularities and human susceptibility, Suspension system, Damping, Double tube damper, Single tube damper, Lever arm type damper, Springs-Leaf springs, Coil and torsion springs, variable rate springs, Composite leaf springs, Rubber springs, Air springs, Adjustable and self-adjusting suspensions, Interconnected suspension system, Interconnected air and liquid suspensions, Independent suspension system, Different independent suspension layouts, McPherson strut type, Rear suspension-live axle, McPherson strut rear suspension.

UNIT IV

Steering Geometry: Castor, Camber, Kingpin inclination, Combined angle, Toe-in, Steering system-basic aims, Ackerman linkage, Steering linkages for independent suspension, Center point steering, Costarring or trailing action, Cornering power, Self-righting torque, Steering characteristics-over steer and under steer, Axle beam, Stub-axle construction, Steering column, Reversible and irreversible steering, Rack-and-pinion steering mechanism, Effect of toe-in on steering, Power steering, Vickers System. Recent trends in automobile engineering Multi fuel automobiles, Automobiles running on alternate sources of energy, Emission control through catalytic converter, Double catalytic converter, Aspects of pollution control in Automobiles.

Reference and Text Books:

1. The Motor Vehicle - By Newton, Steeds and Garretle Basic
2. Automobile Engineering - By Kirpal Singh
3. Automobile Engineering *' -By K.M. Gupta, Umesh Publications

NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

LECTURE PLAN

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	8th Semester	Brief history of automobiles, Main components of an automobile, Brief description of each component	Teaching	
Jan.	8th Semester	Brief description of constructional details and working of a four stroke I.C. Engine	Teaching	
Jan.	8th Semester	S.I. Engines and C.I. Engines including lately developed overhead cam shaft	Teaching	
Jan.	8th Semester	Multi-cylinder engines, Introduction to recent developments in I.C Engine	Teaching	
Jan.	8th Semester	Direct injection systems, Multi-point fuel injection systems	Teaching	
Jan.	8th Semester	Introduction, Brief description of different components of Transmission System.	Teaching	
Jan.	8th Semester	Introduction to Clutch and its different types	Teaching	
Jan.	8th Semester	Principle of Friction Clutch, Clutch Lining and friction materials used in Friction Clutches	Teaching	
Jan.	8th Semester	Torque transmitted, Brief description of Cone Clutch, Single Plate and Multiplate Clutches	Teaching	Assignment
Jan.	8th Semester	Dry and wet clutches, Automatic clutch action ,Centrifugal clutches	Teaching	
Jan.	8th Semester	Electromagnetic clutches, Fluid Flywheel	Teaching	
Feb.	8th Semester	Gear Box Air resistance, Gradient resistance and rolling resistance coming across a moving automobile	Teaching	
Feb.	8th Semester	Tractive effort, Variation of tractive effort with speed	Teaching	
Feb.	8th Semester	Performance curves (object and need of a gear box), Sliding mesh gear box	Teaching	
Feb.	8th Semester	Control mechanism, Sliding type selector mechanism, Ball type selector mechanism	Teaching	
Feb.	8th	Steering column gear shift control, Constant mesh	Teaching	

	Semester	gear box		
Feb.	8th Semester	Synchromesh device, Automatic transmission in general, AP automatic gear box	Teaching	
Feb.	8th Semester	Torque converter, Torque converter with direct drive, Lubrication of Gear Box	Teaching	
Feb.	8th Semester	Functions and requirements of a propeller shaft, Universal Joint	Teaching	
March	8th Semester	Constructional forms of universal joints, Flexible-ring joints	Teaching	
March	8th Semester	Rubber-bushed flexible joints. Constant-velocity joints	Teaching	
March	8th Semester	Principle operation of Differential, Constructional details of a typical Differential unit	Teaching	
March	8th Semester	Multi-plate clutch type traction control device, Brake Functions and methods of operation, Brake efficiency	Teaching	
March	8th Semester	Elementary theory of shoe brake & shoe adjustments, A modern rear-wheel brake	Teaching	
March	8th Semester	Disc brakes, Brake linkages, Leverage and adjustment of the brake linkage	Teaching	
March	8th Semester	Servo- and power operated brakes, Vacuum brake operation	Teaching	
March	8th Semester	Hydraulic Brakes-constructional details and working, Direct action vacuum servos, Power-operated brakes	Teaching	Assignment
March	8th Semester	A dual power air brake system, Suspension principles, Road irregularities and human susceptibility	Teaching	
March	8th Semester	Suspension system, Damping, Double tube damper, Single tube damper, Lever arm type damper, Springs-Leaf springs, Coil and torsion springs	Teaching	
March	8th Semester	variable rate springs, Composite leaf springs, Rubber springs, Air springs, Adjustable and self-adjusting suspensions	Teaching	
April	8th Semester	Interconnected air and liquid suspensions, Independent suspension system, Different	Teaching	

		independent suspension layouts		
April	8th Semester	Steering Geometry -Castor, Camber, Kingpin inclination, Combined angle, Toe-in, Steering system-basic aims, Ackerman linkage	Teaching	
April	8th Semester	Steering linkages for independent suspension, Center point steering, Co-starring or trailing action	Teaching	
April	8th Semester	Cornering power, Self-righting torque, Steering characteristics-over steer and under steer, Axle beam	Teaching	
April	8th Semester	Stub-axle construction, Steering column, Reversible and irreversible steering, Rack-and-pinion steering mechanism	Teaching	
April	8th Semester	Effect of toe-in on steering, Power steering, Vickers System	Teaching	
April	8th Semester	Emission control through catalytic converter, Double catalytic converter, Aspects of pollution control in Automobiles	Teaching	

Tutorial Sheet-1

Q.1 Sketch a chassis of any four wheelers and mark various parts on it. Explain the functions of various components of automobile?

Q.2 Describe the constructional details and working of four stroke diesel engine. How modern C.I engine differ from 80's engines. Enumerate the improvement in last thirty years?

Q.3 What do you mean by Multi Point Fuel Injection System? What are its advantages?

Q.4 Describe how firing order and mechanical balancing is managed in Multi Cylinder I.C. Engine.

Q.5 What is a two stroke engine? Describe its working and compare it with four stroke type.

Q.6 Explain the importance and function of Transmission System in detail?

Q.7 Explain the following with sketches:

i) Microprocessor based fuel supply system

ii) Principle of friction clutch

iii) Electromagnetic clutch

Q.8 Write about single plate clutch and multi plate clutch in detail with diagram?

Q.9 Explain about centrifugal clutch with neat diagram?

Q.10 Explain the construction working and performance of a fluid flywheel. Enumerate the advantages of fluid flywheel over the other types of clutches.

Tutorial Sheet -2

Q.1 Explain about sliding mesh and synchromesh gear boxes with neat diagrams?

Q.2 Write a brief note explaining how the lubrication of automotive gear box is done?

Q.3 What is tractive efforts & explain the variation of tractive efforts with speed?

Q.4 Explain the following with sketches:

(i) Sliding type selector control mechanism

(ii) Ball type selector control mechanism

Q.5 Describe the Torque converter with direct drive?

Q.6Why a propeller shaft is required in a vehicle. What are the functions of propeller shaft?

Q.7 Describe Hotchkiss drive with neat sketch.

Q.8 Explain the necessity of differential in the automobile. Discuss in detail the constructions and operation of the differential.

Q.9 Explain the following with sketches:

(i) Flexible ring joints

(ii) Rubber-bushed flexible joints

(iii) Constant velocity joint

Q.10 Write a short note on multi plate clutch type traction control device?

Tutorial Sheet -3

Q.1Write the different types of braking system used in automobile and explain the modern rear wheel braking system?

Q.2 Sketch the arrangement of pneumatic braking system used in automobiles and explain?

Q.3 Write a short note on servo and power operated brakes?

Q.4 Describe the constructional details and working of hydraulic braking system?

Q.5 why are dampers used in suspension system & explain the different types of damper used in suspension system?

Q.6Explain in detail different type of spring types of spring used in suspension system?

Q.7 Write about the different independent suspension system & explain any one of them in detail?

Q.8 Draw a well labelled diagram of infer-connected air and liquid suspensions and explain how it works.

Q.9 4What are the important components of a good suspension system? What should be their characteristics?

Tutorial Sheet -4

Q.1 Explain clearly how the King-Pin inclination produces directional stability?

Q.2Sketch and explain the construction and working principle of the recirculating Ball type steering gear?

Q.3Write a short note on Rack and pinion steering system.

Q.4 Explain the following terms:

(i) Castor (ii) Camber (iii) Combined angle (iv) Toe-in

Q.5 Explain the Ackermann Steering Mechanism? Write its relative merits?

Q.6 Explain the Devis Steering Mechanism? Write its relative merits?

Q.7 Describe the cam and roller type of Steering Gear with neat diagram?

Q.8 Write about the alternative source of energy used in automobile for emission control.

Q.9 What is the function of a catalytic converter & explain the double catalytic converter used in automobile?

Roll No…… Total No of Pages: 2

ME-8/M-16

AUTOMOBILE ENGINEERING

ME-401

Time: 03 Hours Maximum Marks: 100

Note: *Attempt any five questions in all, selecting at least one question from each unit. Assume any missing data.*

Unit-I

1. Explain the following with sketches:

i) Microprocessor based fuel supply system

ii) Multipoint fuel injection system

iii) Principle of friction clutch

iv) Electromagnetic clutch (20)

2.a) outline major components of an automobile. (10)

b) What is a two stroke engine? Describe its working and compare it with four stroke type. (10)

Unit-II

3.a) Why a propeller shaft is required in a vehicle. What are the functions of propeller shaft? Name different types of the joints in it. Sketch any one (10)

b) Describe Hotchkiss drive with neat sketch. (10)

4.a) Write a brief note explaining how the lubrication of automotive gear box is done?(10)

b) Explain the necessity of differential in the automobile. Discuss in detail the constructions and operation of the differential. (10)

Unit-III

5.a) Describe in detail the constructional feature of the tube and the tubeless tyre to automotive use. Discuss also their relative merits and demerits. (10)

b) What is self-initiating tyre? Describe in detail any such tyre-inflatation system in use Explain also improved system under development. (10)

6.a) Draw a well labelled diagram of infer-connected air and liquid suspensions and explain how it works. (10)

b) What are the important components of a good suspension system? What should be their characteristics? (10)

Unit-IV

7. Explain the term; camber, caster steering axis inclination and toe-in. What are the effects of each on the steering characteristics of a vehicle? (20)

8. a) Explain the working of catalytic convertor with the help of neat sketch.(10)

b) Write a short note on Rack and pinion steering system. (10)

FOUNDRY ENGINEERING								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME–422N	**FOUNDRY ENGINEERING**	4	0	0	75	25	100	3
Purpose	The present course focus on giving the exposure of various Foundry processes for a product whose scale ranges from miniature to extra-large, Moulding-Coring practice, Melting inoculations practices, Quality Control of the casting.							
Course Outcomes								
CO 1	Express Knowledge about the fundamentals of the casting, basic terminology related to casting process.							
CO 2	Decide the alternative method for the manufacturing of component for engineering Applications.							
CO 3	Select the methods of the casting and Decide correct melting practice of different cast alloy & different melt-treatments.							
CO 4	Demonstrate the ability to select the proper molding material, type of furnace with relevant refractory material, use appropriate casting design and temperature measurement device to obtain quality cast products.							
CO5	Minimize the defects generated during casting.							

UNIT-I

Introduction: Introduction to metal casting and foundry industry in modern industrial scenario. Advantages and limitations of casting methods. Classification of foundries. Different sections in a foundry and their functions. Important cast metals and alloys-their composition, properties and uses.

Patterns: Types of patterns, brief classification of pattern making materials, consideration in selection of pattern materials, color coding, pattern allowances, core boxes, types of core boxes.

UNIT-II

Moulding and core making: Ingredients of common type of moulding and core making sands, their properties and behavior, testing of sands and clay.

Moulding processes: Classification of molding processes and casting processes, brief description of all processes such as green sand dry sand, loam sand floor, pit and machine molding.

Casting processes: Shell molding, CO_2 silicate process, Investment casting process, permanent moulding process, Gravity and pressure die casting, centrifugal casting process.

UNIT-III

Elements of Gating system: Classification, basic consideration in gating design, gating ratio, gating practice for ferrous and nonferrous alloys, pouring equipment.

Risering Practice: function of riser, directional and progressive solidification, centerline feeding resistance, riser efficiency, riser design consideration, risering curves, Cain's, N.R.L and modulus method, feeding distance feeding aids, blind and atmospheric risers.

UNIT-IV

Melting Practice: Melting of cast iron, Mechanical features of cupola, operational steps and principles of cupola operation, Advanced practices in the cupola operation, melting of aluminum and copper based alloys including mold treatments such as dressing, grain refining, and modification.

Quality control in foundry: Casting defects, their causes and remedies. Shop floor quality control tests such as composition control, Wedge test, fluidity, temperature measurement. Casting Modification by different methods like Friction stir processing.

Reference Books:

1. Manufacturing Technology: Foundry, Forming and Welding by P.N.Rao, Tata McGraw Hill Education Private Limited
2. Principles of Metal Casting, R. W. Heine, C. R. Loper and P. C. Rosenthal, (Tata McGraw Hill)
3. Principles of Foundry Technology, P. L. Jain, (Tata McGraw Hill).
4. Fundamentals of Metal Casting Technology, P. C. Mukherjee, (Oxford & IBH)
5. Foundry Technology, P. R. Beeley
6. Foundry Engineering, H. F. Taylor, M. C. Flemings,(Wiley Eastern)
7. Foundry Technology, D. Kumar & S. K. Jain, (CBS Pub.)

NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

Lecture Plan

Foundry Engineering

ME-422N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	8th Semester	Introduction to metal casting and foundry industry in modern industrial scenario	Teaching	
Jan.	8th Semester	Advantages and limitations of casting methods	Teaching	
Jan.	8th Semester	Classification of foundries. Different sections in a foundry and their functions.	Teaching	
Jan.	8th Semester	Important cast metals and alloys-their composition, properties and uses.	Teaching	
Jan.	8th Semester	Types of patterns, brief classification of pattern making materials	Teaching	
Jan.	8th Semester	Consideration in selection of pattern materials	Teaching	
Jan.	8th Semester	Color coding, pattern allowances, core boxes, types of core boxes	Teaching	
Jan.	8th Semester	Ingredients of common type of moulding and core making sands	Teaching	
Jan.	8th Semester	Core making sands, their properties and behavior, testing of sands and clay	Teaching	
Jan.	8th Semester	Classification of molding processes and casting processes	Teaching	
Jan.	8th Semester	Brief description of all processes such as green sand dry sand, loam sand floor	Teaching	Assignment
Feb.	8th Semester	Pit and machine molding	Teaching	
Feb.	8th Semester	Shell molding, CO_2 silicate process	Teaching	
Feb.	8th Semester	Investment casting process, permanent moulding process	Teaching	
Feb.	8th Semester	Gravity and pressure die casting	Teaching	

Feb.	8th Semester	Centrifugal casting process	Teaching	
Feb.	8th Semester	Classification, basic consideration in gating design	Teaching	
Feb.	8th Semester	Gating ratio, gating practice for ferrous and nonferrous alloys, pouring equipment	Teaching	
Feb.	8th Semester	Function of riser, directional and progressive solidification	Teaching	Assignment
March	8th Semester	Centerline feeding resistance, riser efficiency	Teaching	
March	8th Semester	Riser design consideration, risering curves	Teaching	
March	8th Semester	Cain's, N.R.L and modulus method	Teaching	
March	8th Semester	Feeding distance feeding aids, blind and atmospheric risers.	Teaching	
March	8th Semester	Melting of cast iron, Mechanical features of cupola	Teaching	
March	8th Semester	Operational steps of cupola operation	Teaching	
March	8th Semester	Principles of cupola operation	Teaching	
March	8th Semester	Advanced practices in the cupola operation	Teaching	
March	8th Semester	Melting of aluminum based alloys	Teaching	
March	8th Semester	Mold treatments of aluminum based alloys such as dressing	Teaching	
March	8th Semester	Grain refining, and modification of copper based alloys	Teaching	Assignment
April	8th Semester	Melting of copper based alloys	Teaching	
April	8th Semester	Mold treatments of copper based alloys such as dressing	Teaching	
April	8th Semester	Grain refining, and modification of copper based alloys	Teaching	
April	8th Semester	Casting defects, their causes and remedies	Teaching	
April	8th Semester	Shop floor quality control tests such as composition control	Teaching	
April	8th Semester	Wedge test, fluidity, temperature measurement	Teaching	
April	8th Semester	Casting Modification by different methods like Friction stir processing	Teaching	Assignment

TUTORIAL SHEET -1

1. What is a metal casting process?
2. Explain the industrial scenario of metal casting and foundry industry
3. What are the advantages and limitations of casting methods?
4. What are the various classifications of foundries
5. Name different sections in a foundry and explain their functions
6. Describe various compositions of cast metals and alloys
7. What are the various types of patterns?
8. Explain briefly the classification of pattern making materials
9. What are the various consideration in selection of pattern materials?
10. Name different types of pattern allowances? Why allowances are provided on patterns?
11. What are the types of core boxes?

TUTORIAL SHEET -2

1. What are the various moulding materials used in foundry.
2. Name the essential constituents of moulding sand and explain various properties of moulding sand?
3. Briefly describe the processes of green sand, dry sand and loam sand and what are the functions of additives in moulding sand.
4. Explain the classification of molding processes and casting processes
5. Explain pitting and molding machines.
6. Discuss the “Shell moulding” method with the help of diagrams, .
7. Describe the procedure of making castings by the investment casting process
8. Define continuous casting method with suitable diagram?
9. What are the different methods of die casting?
10. Describe the process, advantages and limitations of centrifugal casting process

TUTORIAL SHEET -3

1. What do you understand from the gating system?

2. What are the different types of gates? Explain in detail
3. Describe the different elements of a gating system?
4. How riser and gating system is designed
5. Define gating ratio
6. What the various pouring equipments
7. What are the various riser design considerations?
8. Describe briefly risering curves
9. Explain N.R.L and modulus method
10. What are blind and atmospheric risers.

TUTORIAL SHEET -4

1. What are the various mechanical features of cupola?
2. Draw neat sketch of cupola furnace. Explain different heat zones in it.
3. Explain the working of cupola with the help of diagram
4. Explain dressing, grain refining, and modification of an aluminum alloy
5. Explain dressing, grain refining, and modification of a copper based alloys
6. Sketch the various sand mould casting defects. Give their causes and remedies.
7. Discuss the various methods of cleaning the surfaces of castings.
8. What are the quality tests in foundry?
9. Explain wedge test, fluidity and temperature measurement in foundry
10. Describe Friction stir processing

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME–426N	**Manufacturing Management**	4	0	0	75	25	100	3
Purpose	Students will be able to comprehend the major aspects of Manufacturing management like production & operation management, plant location and layout, material handling and management, Waste Management & Automation.							
Course Outcomes								
CO 1	Students will be able to attain the theoretical knowledge of production & operation management.							
CO 2	Students will be able to attain the theoretical knowledge of the concept of plant location and layout.							
CO 3	Students will be able to attain the theoretical knowledge of material handling and management.							
CO 4	Students will be able to attain the theoretical knowledge of Waste Management & Automation.							

UNIT-I

Introduction to Production and Operation Management: Introduction, Historical Evolution of Production and Operation Management, Concept of Production, Production System, Production Management, Operation System, Operation Management, Managing Global Operations, Scope of Production and Operation Management.

UNIT-II

Plant Location and Layout: Introduction and Meaning, Need for Selecting a Suitable Location, Factors influencing Plant location, Location theories, Location models, Location economics, Plant layout, Classification of layout, Design of Product layout, Design of Process layout, Service layout, Organization of physical facilities.

UNIT-III

Material Handling and Management: Introduction, Objectives of Material Handling, Principles of Material Handling, Selection of Material Handling Equipment, Evaluation of Material Handling System, Material Handling Equipment, Guidelines for Effective Utilization of Material Handling Equipment, Relationship Between Plant Layout and Material Handling, Scope and Function of Material Management, Material Planning and Control, Inventory Control, Standardization, Simplification, Ergonomics, Just-in-Time(JIT) Manufacturing.

UNIT-IV

Waste Management: Introduction Reasons for Generation and Accumulation of Obsolete, Surplus and Scrap Items, Identification and Control of Waste, Disposal of Waste.

Automation: Introduction, Types of Automation, Computer Integrated Manufacturing, Reasons for Automation, Advantages and Disadvantages of Automation, Automation Strategies, Automated Flow Lines, Automated Guided Vehicles System, Automated Storage/Retrieval System.

REFERENCES AND TEXT BOOKS:

1 **.**Production and operational management by S. Anil Kumar/N. Suresh**.**
2 **.**Production and operational management by Pratibha Garg**.**
3 **.**Modern Production Management Systems by Sushil Gupta Martin Starr**.**
4 **.**Manufacturing Operations Management by Sanjay Sharma**.**

NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

LECTURE PLAN

MANUFACTURING MANAGEMENT

ME-426N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	8th Semester	Introduction, Historical evolution of production and operation management	Teaching	
Jan.	8th Semester	Concept of Production	Teaching	
Jan.	8th Semester	Production system	Teaching	
Jan.	8th Semester	Production Management	Teaching	
Jan.	8th Semester	Operation system	Teaching	
Jan.	8th Semester	Operation management	Teaching	
Jan.	8th Semester	Managing global operation	Teaching	
Jan.	8th Semester	Scope of production & operation management	Teaching	Assignment
Jan.	8th Semester	Introduction and Meaning, Need for Selecting a Suitable Location	Teaching	
Feb.	8th Semester	Factors influencing Plant location, Plant location	Teaching	
Feb.	8th Semester	Location theories	Teaching	
Feb.	8th Semester	Location models, Location economics	Teaching	

Feb.	8th Semester	Plant layout, Classification of layout	Teaching	
Feb.	8th Semester	Design of Product layout, Design of Process layout	Teaching	
Feb.	8th Semester	Service layout, Organization of physical facilities.	Teaching	Assignment
Feb.	8th Semester	Introduction, Objectives of Material Handling, Principles of Material Handling	Teaching	
March	8th Semester	Selection of Material Handling Equipment, Evaluation of Material Handling System, Material Handling Equipment	Teaching	
March	8th Semester	Guidelines for Effective Utilization of Material Handling Equipment	Teaching	
March	8th Semester	Relationship Between Plant Layout and Material Handling	Teaching	
March	8th Semester	Scope and Function of Material Management	Teaching	
March	8th Semester	Material Planning and Control, Inventory Control	Teaching	
March	8th Semester	Standardization, Simplification	Teaching	
March	8th Semester	Ergonomics	Teaching	
March	8th Semester	Just-in-Time(JIT) Manufacturing	Teaching	Assignment
March	8th Semester	Introduction, Reasons for Generation and Accumulation of Obsolete	Teaching	
April	8th Semester	Surplus and Scrap Items, Identification and Control of Waste	Teaching	

April	8th Semester	Disposal of Waste	Teaching	Assignment
April	8th Semester	Introduction, Types of Automation	Teaching	
April	8th Semester	Computer Integrated Manufacturing	Teaching	
April	8th Semester	Reasons for Automation, Advantages and Disadvantages of Automation, Automation Strategies	Teaching	
April	8th semester	Automated Flow Lines, Automated Guided Vehicles System	Teaching	
April	8th semester	Automated Storage/Retrieval System.	Teaching	

Assignment-I

Q-1 What do you understand by production management? What are the major activities which constitute its scope?

Q-2 Give brief history of the development of production management. Discuss its importance in modern business.

Q-3 Define production management and explain its scope. Also mention the responsibilities or duties of production manager.

Q-4 What do you understand by operation management? What are the major activities which constitute its scope?

Q-5 Give brief history of the development of operation management. Discuss its importance in modern business.

Q-6 Define operation management and explain its scope.

Q-7 Define the term decision making in production management. What are the various steps in decision making process?

Q-8 Discuss the production system. Discuss problems associated with production system.

Assignment-II

Q-1 Describe the principles of plant layout. Write a note on factors affecting plant layout.

Q-2 Describe the different types of plant layout.

Q-3 State the advantages and disadvantages of selecting an urban location and rural location for plant site.

Q-4 What do you understand by plant design? Discuss the various factors to be considered in deciding the location of a plant.

Q-5 What is the distinction between a product and process layout? What are the conditions for which each type is appropriate?

Q-6 What is the difference between functional layout and product layout of machine. State the advantages and limitations of the two.

Q-7 State the reason for the location of:

(i) Iron and steel plants in Odisha and Bihar

(ii) Textile industries at Mumbai and Ahmedabad

(iii) Glass and Bangle plants in Firozabad

(iv) Sugar industries in UP

(v) Woollen carpets in Mirzapur

Q-8 Discuss the factors which influence the layout of a plant manufacturing nuts and bolts on mass scale.

Q-9 Write a short note on locational economics.

Q-10 You have to propose to establish a sugar mill in Rajasthan. Discuss the factors which should be taken into consideration in selecting a site.

Assignment-III

Q-1 What are the factors that must be considered in the reduction of handling of materials? Discuss why there is usually a good opportunity for the reduction of material handling cost?

Q-2 What are major divisions in the classification of material handling equipment? What factors must be taken into consideration in the selection of materials handling equipment.

Q-3 What are the major classes of material handling equipment.

Q-4 Mechanical handling of materials improve the quality and quantity of manufacture. Discuss.

Q-5 Propose suitable material handling equipment required in stores of an automobile factory

Q-6 Propose suitable material handling equipment required in light engineering production.

Q-7 State and discuss the economic principles of material handling.

Q-8 Define ergonomics. What is the importance of ergonomics? Discuss objectives & its advantages.

Q-9 What is man machine system? What are the characteristics of this system? Explain its capabilities.

Q-10. Define JIT. Explain the basic elements of JIT. Discuss the goals, basic principles of JIT. Define areas of application of JIT.

Assignment-IV

Q-1 Classify different types of waste. What are reasons for the generation of waste?

Q-2 Discuss systematic approach to waste reduction, waste collection & recycling system.

Q-3 What are the primary sources of surplus?

Q-4 Discuss disposal of surplus and scrap. Discuss disposal routes.

Q-5 Define automation. Classify different types of automation.

Q-6 What are the reasons for automation? Discuss advantages and disadvantages of automation.

Q-7 What do you mean by automation strategies and automated flow lines?

Q-8 Discuss automated storage/retrieval system.

Q-9 Discuss automated guided vehicles system.

Q-10 Define computer integrated manufacturing. What are the applications of CIM?

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME – 404N	**POWER PLANT ENGINEERING**	4	0	0	75	25	100	3
Purpose	To make student aware about the modern aspects of power generation, problems of energy demand and supply and power plant economics.							
Course Outcomes								
CO1	To introduce about the different sources of energy, hydrology and hydro power generation.							
CO2	To analyze the steam power cycles, steam generators, fuels and different handling systems in power plants.							
CO3	To understand the concept of combined cycles power generation and diesel engine power plants.							
CO4	To know about the nuclear energy and the economics of power generation.							

UNIT I

Energy Sources: Conventional and non-conventional sources of energy, Geothermal power plants, Tidal power plants, Windmills, Solar power plants, Solar thermal, Solar Photovoltaic: Direct energy conversion systems, Energy sources in India, Recent developments in power plants.

Hydroelectric Power Plant: Hydrology, Rainfall, runoff, hydrographs, flow duration curves, Site selection for hydro power plants, Classification of hydro power plants, Storage type hydro power plant and its operation, Estimation of power availability, Selection of water turbines, Combination of hydro power plants with steam plants, advantages and disadvantages of hydro power plants.

UNIT II

Analysis of Steam Cycle: The Carnot, The ideal Rankine cycle, externally irreversible Rankine cycle, Superheat, Reheat, Regeneration, internally irreversible Rankine cycle, open feed water heaters, closed type feed water heaters, Typical layout of steam power plant, Efficiency and heat rate.

Steam Generators: Introduction to steam generators, Steam generator control, Fluidized bed boilers, Modern high pressure boilers, Supercritical boilers, Ultra supercritical technology, Advanced Ultra supercritical technology, Flue gas de-nitrification and desulphurization, fabric filters and baghouses, feed water treatment, Deaeration, Internal treatment, boiler blowdown, steam purity.

Fuel and Combustion: Coal as fuel, classification of coals, analysis of coal, Coal handling, Dead and live storage, Combustion of coal, combustion equipment for coal burning, mechanical

stokers, pulverized fuels and burners, Cyclone furnace, Low NO_X burners, Ash handling and disposal, Dust collectors. Heat balance sheet for thermal power plants, environmental aspects of power generations.

UNIT III

Diesel Engine Power Plants: Applications of diesel engines in power field, Advantages and disadvantages of diesel plants over thermal power plants, Schematic arrangement of diesel engine power plant, Different systems of diesel power plant, Performance Characteristics, Supercharging, Layout of Diesel Engine power plant.

Gas Turbine and Combined Cycles: Gas turbine cycles, the ideal Brayton cycle, the non-ideal Brayton cycle, Modification of the Brayton cycle, Gas turbine characteristics, Combined Cycles: combined cycles with heat recovery boiler, The STAG combined-cycle power plant, combined cycles with multi-pressure steam, combined cycle for nuclear power plants.

UNIT IV

Nuclear Power Plants: Basic theory and terminology, Nuclear fission and fusion processes, Fission chain reaction, Moderation, Fertile materials, Nuclear fuels, General components of nuclear reactor, Different types of reactors: PWR, BWR, GCR, LMFBR, CANDU-PHW, India's nuclear power program, Disposal of nuclear waste and related issues.

Economics of Power Generation: Introduction to economics of power generation, Different terms and definitions, Cost analysis, Selection of power plant equipment, factors affecting economics of generation and distribution of power, Performance and operating characteristics of power plants, Economic load sharing, Tariff for electrical energy.

Text Books:

1. Power Plant Engineering by Morse.
2. Power Plant Engineering by PK Nag.
3. Power Plant Technology -By El-Wakil.
4. Power Plant Engineering by Domkundawar.

Reference Books:

1. Power Plant Engineering -By P.C. Sharma
2. Power Plant Technology- By G.D.Rai
3. Power Plant Engineering by R.K. Rajput

NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME – 406N	**QUALITY ASSURANCE & RELIABILITY**	4	0	0	75	25	100	3
Purpose	This course provides the understanding of Concepts of quality in engineering domain. Various aspects of quality such as quality management, statistical quality control, system reliability, etc. will be taught to students.							
Course Outcomes								
CO1	Students will understand the concepts of quality, quality assurance and management.							
CO2	Students will be able to demonstrate the ability to use the methods of statistical process control and able to use and interpret control charts for variables.							
CO3	Students will be able to use and interpret control charts for attributes, also able to understand sampling inspection.							
CO4	Understand the concepts of reliability, carry out reliability data analysis, Get acquainted with computation of system reliability and reliability improvement methods.							

UNIT I

Introduction- Definition of Quality, Quality function, Dimensions of Quality, Brief history of quality methodology, Statistical methods for quality improvement, Quality costs, Introduction to Quality function deployment.

Quality Assurance (QA) - Introduction, Definition, Management principles in QA, Forms of QA, QA in different stages. Quality planning, QA program, QA aspect, Quality in material management, Vendor selection & development.

UNIT II

Statistical Process Control - Introduction to statistical process control, Concept of variation, Assignable & Chance causes, Attributes & variables, Frequency distribution curve & its types. Normal Distribution curve, Problems on FD curve & ND curve, Application of SPC.

Control Charts for Variables- Definition, Formulae & its problems. Control chart patterns, Process capability. Problems on x & R chart and Process capability.

UNIT III

Control Charts for Attributes- Definition, Formulae & its problems. Problems on p, c charts. Choice between variables and attributes control charts. Guidelines for implementing control charts.

Sampling Inspection - Sampling: Definition, types of sampling, importance, benefits and limitations of sampling, Operating Characteristic Curve, Average Outgoing Quality Curve, Errors in Making Inferences from Control Charts (Type I and II errors).

UNIT IV

Reliability Concepts - Introduction of Reliability concepts, Failure data analysis and examples, Failure rate, Failure density, Probability of failure, Mortality rate, Mean time to failure, Reliability in terms of Hazard rate and Failure Density, examples, Useful life and wear out phase of a system,

System Reliability and Improvement: Reliability of series and parallel connected systems and examples, Logic diagrams, Improvement of system reliability, Element Redundancy, Unit redundancy, Standby redundancy.

Suggested Reading:

1. Grant E L, Statistical Quality Control", McGraw-Hill.
2. Mahajan, "Quality Control and Reliability", Dhanpat Rai & Sons
3. Srinath L S, "Reliability Engineering", East west press.
4. Sharma S C, Inspection Quality Control and Reliability, Khanna Publishers

NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

LECTURE PLAN

Power plant Engineering

ME-404N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	Conventional and non conventional sources of energy,geothermal power plants	Teaching	
Jan.	6th Semester	Tidal power plants,windmills,solar power plants	Teaching	
Jan.	6th Semester	Solar thermal and solar photovoltaic	Teaching	
Jan.	6th Semester	Direct energy conversion systems,Energy sources in india,Recent development in power plants	Teaching	
Jan.	6th Semester	Hydrology,rainfall and runoff	Teaching	
Jan.	6th Semester	Hydrographs and flow duration curves	Teaching	
Jan.	6th Semester	Site selection for hydro power plants and classification of hydro power plants	Teaching	
Jan.	6th Semester	Storage type hydro power plant and its operation,Estimation of power availability	Teaching	
Jan.	6th Semester	Selection of water turbines.combination of hydroplants with steam plants.	Teaching	
Jan.	6th Semester	Advantages and disadvantages of hydropower plants	Teaching	
Jan.	6th Semester	Applictions of diesel engine in power field,Advantages and disadvantages of diesel plants over thermal power plants	Teaching	
Feb.	6th Semester	Schematic arrangement of diesel engine power plant,Different systems of diesel	Teaching	

		power plants		
Feb.	6th Semester	Performance characteristics of supercharging,layout of diesel engine power plant	Teaching	
Feb.	6th Semester	Gas turbine cycles,the ideal brayton cycle and the non ideal brayton cycle	Teaching	
Feb.	6th Semester	Modification of the brayton cycle,Gas turbine characteristics	Teaching	
Feb.	6th Semester	Combined cycles with heat recovery boiler.TheSTAG Combined cycle power plant	Teaching	
Feb.	6th Semester	Combined cycle with multipresssure ,Combined cycle for nuclear power plants	Teaching	
Feb.	6th Semester	The carnot,The ideal rankine cycle,externally irreversible rankine cycle	Teaching	
Feb.	6th Semester	Superheat,Reheat,Regeneration,Internally irreversible rankine cycle	Teaching	
March	6th Semester	Open feed water heaters,closed type feed water heaters,Typical layout of steam power plant,efficiency and heat rate	Teaching	
March	6th Semester	Introduction to steam generators,Steam generator control,Fluidized bed boilers	Teaching	
March	6th Semester	Modern high pressue boilers,super critical boilers,ultra supercritical technology,advancaed ultra super critical technology,flue gas de nitrification and desulphurization	Teaching	Assignment
March	6th Semester	Fabric filters and bag houses,feed water treatment,boiler blowdown,steam purity	Teaching	
March	6th Semester	Basic theory and terminology,Nuclear fission and fusion processes	Teaching	
March	6th	Fission chain reactions,Moderation,Fertile	Teaching	

	Semester	materials		
March	6th Semester	Nuclear fuels,General componenents of nuclear reactor	Teaching	
March	6th Semester	Different types of reactors PWR,BWR,GCR etc.	Teaching	
March	6th Semester	Indias nuclear power programme,disposal of nuclear waste and related issues	Teaching	
March	6th Semester	Introduction to economics of power generation	Teaching	
March	6th Semester	Different terms and definitions	Teaching	
April	6th Semester	Selection of power plant equpment	Teaching	
April	6th Semester	Factors affecting economics of generation and distribution of power	Teaching	
April	6th Semester	Performance and operating characteristics of power plants,Economic load sharing	Teaching	
April	6th Semester	Tariff for electrical energy	Teaching	

Tutorial Sheet-1

1Q. What is the difference between conventional and non conventional sources of energy?

2Q. What are Geothermal power plants? What is important for their site selection?

3Q. What are Tidal power pants? Explain their significance?

4Q. Compare solar and thermal power plants in detail?

5Q. What are photo voltaic cells?Explain the photo voltaic part in detail?

6Q. Explain hydrograps and flow duration curves in detail with their significance?

7Q Explain the different sites for hydro plants and classify them?

8Q Explain storage type hydro power plant and its operation?

9Q What is the criteria for selection of watr turbines?

10Q. What is the significance of combining steam plants with hydro plants?

Tutorial Sheet-2

1Q. What is carnot cycle ? Explain its significance?

2Q. What is ideal Rankine cycle? Whose it is its principle?

3Q. What is ideal Rankine cycle and externally irreversible rankine cycle?

4Q. What is superheat in analysis of steam cycle?What is its significance?

5Q. What is Reheating , Why it is done ?

6Q. What is Regeneration ? Why it is done?

7Q. What is the difference between open and closed feed water heaters?

8Q. What are modern high pressure boilers?Explain some?

9Q. What is feed water treatment? Why it is done

10Q. Numerical problems related to heat balance sheet (any from text book)

Tutorial Sheet -3

1Q. Explain the applications of diesel engines in power field in the today scenario?

2Q, Explain the advantages and disadvantages of diesel power plants over thermal power plants?

3Q.Explain the arrangement of diesel engine power plant?

4Q.Explain perforformnace characteristics of various diesel engine power plants?

5Q.Explain the layout of diesel engine power plant?

6Q.Explain the ideal brayton cycle?

7Q.Explain the thediff erence between ideal and non ideal brayton cycle?

8Q.Explain the gas turbine characteristics?

9Q.Explain the stag combined cycle power plant?

10Q.What is combined for nuclear power plants

Tutorial Sheet-4

1Q. What is the difference between nuclear fission and fusion process?

2Q. What is moderation , fertile materials and nuclear fuels?

3Q. Explain general components of nuclear reactor?

4Q. Explain PWR reactor in detail?

5Q. Explain the various reactors

1. BWR
2. GCR
3. LMFBR
4. CCANDU-PHW

6Q. Explain how the nuclear waste is disposed ?

7Q. What is meant by tariff for electrical energy ?

8Q. What are operating and performance characteristics of power plants?

9Q. What do you understand by the term economic term economic load sharing?

10Q. How the power plant equipment is selected?

B. Tech. 8th Semester Mechanical Engineering								
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		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME – 406N	**QUALITY ASSURANCE & RELIABILITY**	4	0	0	75	25	100	3
Purpose	This course provides the understanding of Concepts of quality in engineering domain. Various aspects of quality such as quality management, statistical quality control, system reliability, etc. will be taught to students.							
Course Outcomes								
CO1	Students will understand the concepts of quality, quality assurance and management.							
CO2	Students will be able to demonstrate the ability to use the methods of statistical process control and able to use and interpret control charts for variables.							
CO3	Students will be able to use and interpret control charts for attributes, also able to understand sampling inspection.							
CO4	Understand the concepts of reliability, carry out reliability data analysis, Get acquainted with computation of system reliability and reliability improvement methods.							

UNIT I

Introduction- Definition of Quality, Quality function, Dimensions of Quality, Brief history of quality methodology, Statistical methods for quality improvement, Quality costs, Introduction to Quality function deployment.

Quality Assurance (QA) - Introduction, Definition, Management principles in QA, Forms of QA, QA in different stages. Quality planning, QA program, QA aspect, Quality in material management, Vendor selection & development.

UNIT II

Statistical Process Control - Introduction to statistical process control, Concept of variation, Assignable & Chance causes, Attributes & variables, Frequency distribution curve & its types. Attributes & variables, Frequency distribution curve & its types, Problems on FD curve & ND curve, Problems on FD curve & ND curve.

Control Charts for Variables- Definition, Formulae & its problems. Control chart patterns, Process capability. Problems on x & R chart and Process capability.

UNIT III

Control Charts for Attributes- Definition, Formulae & its problems. Problems on p, c charts. Choice between variables and attributes control charts. Guidelines for implementing control charts.

Sampling Inspection - Sampling: Definition, types of sampling, importance, benefits and limitations of sampling, Operating Characteristic Curve, Average Outgoing Quality Curve, Errors in Making Inferences from Control Charts (Type I and II errors).

UNIT IV

Reliability Concepts - Introduction of Reliability concepts, Failure data analysis and examples, Failure rate, Failure density, Probability of failure, Mortality rate, Mean time to failure, Reliability in terms of Hazard rate and Failure Density, examples, Useful life and wear out phase of a system,

System Reliability and Improvement: Reliability of series and parallel connected systems and examples, Logic diagrams, Improvement of system reliability, Element Redundancy, Unit redundancy, Standby redundancy.

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NOTE: In the semester examination, the examiner will set 8 questions in all, at least one question from each unit, and students will be required to attempt only 5 questions.

LECTURE PLAN

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	8th Semester	Definition of Quality, Quality function	Teaching	
Jan.	8th Semester	Dimensions of Quality, Brief history of quality methodology	Teaching	
Jan.	8th Semester	Statistical methods for quality improvements	Teaching	
Jan.	8th Semester	Quality costs, Introduction to Quality function deployment.	Teaching	
Jan.	8th Semester	Introduction, Definition, Management principles in QA	Teaching	
Jan.	8th Semester	. Forms of QA, QA in different stage	Teaching	
Jan.	8th Semester	Quality planning, QA program	Teaching	
Jan.	8th Semester	Quality in material management, Vendor selection & development	Teaching	
Jan.	8th Semester	Introduction to statistical process control, Concept of variation	Teaching	
Jan.	8th Semester	Assignable & Chance causes, Attributes & variables	Teaching	
Jan.	8th Semester	Attributes & variables, Frequency distribution curve & its types	Teaching	

Feb.	8th Semester	Problems on FD curve & ND curve	Teaching	
Feb.	8th Semester	Definition, Formulae	Teaching	
Feb.	8th Semester	its problems	Teaching	
Feb.	8th Semester	. Control chart patterns	Teaching	
Feb.	8th Semester	Process capability	Teaching	
Feb.	8th Semester	Process capability	Teaching	
Feb.	8th Semester	Process capability Process capability	Teaching	
Feb.	8th Semester	Definition for control chart for attributes	Teaching	
March	8th Semester	Formulae & its problems	Teaching	
March	8th Semester	. Problems on p, c charts.	Teaching	
March	8th Semester	Choice between variables and attributes control charts	Teaching	
March	8th Semester	Guidelines for implementing control charts.	Teaching	
March	8th Semester	Sampling: Definition, types of sampling	Teaching	
March	8th Semester	, importance, benefits and limitations of sampling	Teaching	
March	8th	, Average Outgoing Quality Curve	Teaching	

	Semester			
March	8th Semester	Operating Characteristic Curve	Teaching	
March	8th Semester	Errors in Making Inferences from Control Charts (Type I and II errors). Introduction of Reliability concep	Teaching	
March	8th Semester	Failure density, Probability of failure, ,	Teaching	
March	8th Semester	Reliability of series and parallel connected systems and examples, Logic diagrams,	Teaching	
April	8th Semester	Improvement of system reliability, Element Redundancy,	Teaching	
April	8th Semester	Unit redundancy, Standby redundancy	Teaching	
April	8th Semester	Unit redundancy, Standby redundancy	Teaching	
April	8th Semester	Mortality rate, Mean time to failure	Teaching	
April	8th Semester	Unit redundancy, Standby redundancy	Teaching	

Assignment-1

1. Define quality and what are factors affecting the quality control?
2. Explain the difference between inspection and quality control?
3. Inspection is tool for controlling quality, comment?
4. What are the objectives of quality control?
5. What are the functions of inspection department?
6. How does quality help in achieving manufacturing excellence?
7. What is cost of quality and explain different types of quality cost?
8. Explain the optimum cost of performance?
9. Define quality of conformance, quality performance, quality assurance, total quality control?
10. What are objectives of inspection (inspection activities)?

Assignment -2

1. Explain OC curve. What is LTPD and AOQL?
2. Expalin sequential sampling and characteristics of goods sampling plan?
3. What are the advantages of acceptance sampling by variables?
4. What is acceptance sampling, what are its advantages and limitation?
5. Explain the following :-

    a) AOL
    b) ROL
    c) GOL
    d) AOQ
6. State different methods of sampling?
7. What you mean by sampling plan, discuss single sampling plan?
8. Explain bath tub curve with neat diagram?
9. Explain dodge roaming sampling plan for sampling.
10. Describe douple sampling plan and also explain in what way it is better than single sampling plan?

Assignment -3

1Q. What is statistical process control in quality control?

2Q. What is assignable and chance causes differentiate between them?

3Q .What is difference between attributes and variablaes?

4Q.What is frequency distribution curve and its types?

5Q.Explai n the problems of fD and ND curve?

6Q.What are control chart patterns? Explain

7Q.What are Xand R charts?

8Q.What is process capability analysis?

9Q.Determine control limit for x bar and R chart if bar = 357.50,

=9.90,number of groups=20

Given data:- a2=0.18,d3=0.41,d4=1.59 &;d2=3.7,find process capability?

10Q.Draw a suitable control chart for the given data :

Item No.	**No. of defects**
1	**5**
2	**6**
3	**3**
4	**1**
5	**2**
6	**6**
7	**8**
8	**7**
9	**9**
10	**3**
11	**6**
12	**5**
13	**8**
14	**4**
15	**2**

Assignment -4

1. What you mean by reliability and explain factors affecting reliability?
2. Poisson's distribution and comparison between Poisson's and binomial distribution formulation?
3. Explain how are reliability is evaluated in series and parallel system?
4. What is redundancy? What is the effect of placing redundancy in a system?
5. Explain mean time between failure and also explain the following:-
   a) System reliability
   b) Reliability analysis
6. What are different methods to improve reliability?
7. Write short notes on :-

a) MTTF

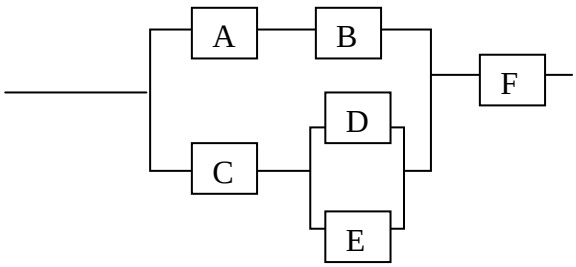
b) MTBF

8. Write briefly on the following :

a) Availability and Maintainability

b) Designing of Reliability.

9. A system of combination of series and parallel elements is shown below the reliability of the elemens, Determine the reliability of the system.



Given

$R_A=R_B=0.95$

$R_C=0.94$

$R_D=R_E=0.96$

Q10. Write briefly on :-

(a) Availability and Maintainability

(b) Reliability control during manufacturing

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Theory**	**Sessional**	**Total**	
ME – 408N	**AUTOMOBILE ENGINEERING LAB**	0	0	2	40	60	100	3
Purpose	To understand construction details and working of various parts of automotive system							
Course Outcomes								
CO1	To make students aware withconstructional details and working of Cylinder, Ignition System and Injection System of I C Engine.							
CO2	To make students aware with constructional details of Automotive Clutches, Automotive Transmission Systems Automotive Drive Lines & Differentials.							
CO3	To make students aware with the Design and constructional details of Automotive Suspension Systems and Automotive Suspension Systems.							
CO4	To make students aware with t Design and constructional details Automotive Tyres& wheels Automotive Brake Systems Automotive Emission / Pollution control systems.							

LIST OF EXPERIMENTS

1. To study and prepare report on the constructional details, working principles and operation of the following Automotive Engine Systems & Sub Systems.
(a) Multi-cylinder: Diesel and Petrol Engines.
(b) Engine cooling & lubricating Systems.
(c) Engine starting Systems.
(d) Contact Point & Electronic Ignition Systems.

2. To study and prepare report on the constructional details, working principles and operation of the following Fuels supply systems:
(a) Carburetors (b) Diesel Fuel Injection Systems (c) Gasoline Fuel Injection Systems.

3. To study and prepare report on the constructional details, working principles and operation of the following Automotive Clutches. (a) Coil-Spring Clutch (b) Diaphragm – Spring Clutch. (c) Double Disk Clutch.

4. To study and prepare report on the constructional details, working principles and operation of the following Automotive Transmission systems. (a) Synchromesh – Four speed Range. (b) Transaxle with Dual Speed Range. (c) Four Wheel Drive and Transfer Case. (d) Steering Column and Floor – Shift levers.

5. To study and prepare report on the constructional details, working principles and operation of the following Automotive Drive Lines & Differentials. (a) Rear Wheel Drive Line. (b) Front Wheel Drive Line. (c) Differentials, Drive Axles and Four Wheel Drive Line.

6. To study and prepare report on the constructional details, working principles and operation of the following Automotive Suspension Systems. (a) Front Suspension System. (b) Rear Suspension System.

7. To study and prepare report on the constructional details, working principles and operation of the following Automotive Suspension Systems. (a) Manual Steering Systems, e.g. Pitman –arm steering, Rack & Pinion steering. (b) Power steering Systems, e.g. Rack and Pinion Power Steering System. (c) Steering Wheels and Columns e.g. Tilt & Telescopic steering Wheels, Collapsible Steering Columns.

8. To study and prepare report on the constructional details, working principles and operation of the following Automotive Tyres& wheels. (a) Various Types of Bias & Radial Tyres. (b) Various Types of wheels.

9. To study and prepare report on the constructional details, working principles and operation of the Automotive Brake systems. (a) Hydraulic & Pneumatic Brake systems. (b) Drum Brake System. (c) Disk Brake System. (d) Antilock Brake System. (e) System Packing & Other Brakes.

10.To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.

NOTE:

1. At least ten experiments are to be performed in the Semester.

2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or as designed & set by the concerned institution as per the scope of the syllabus

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Practical**	**Sessional**	**Total**	
ME – 410N	**PROJECT-II**	0	0	**10**	100	100	200	3

The students expected to take up a project under the guidance of teacher from the college. The project must be based on mechanical engineering problems, which can be extended up to the full semester. The students may be asked to work individually or in a group not more than four students in a group. Viva- voce must be based on the preliminary report submitted by students related to the project.

B. Tech. 8th Semester Mechanical Engineering								
Course No.	**Course Title**	**Teaching Schedule**			**Allotment of Marks**			**Duration of Exam (Hrs.)**
		L	**T**	**P**	**Practical**	**Sessional**	**Total**	
ME–412N	**SEMINAR- II**	0	2	0	0	100	100	

The students are required to deliver a seminar on some emerging areas of Mechanical Engineering, given as follows:

- CAD/CAM/CAE/FEA
- Robotics
- Machine Vision
- Automation
- Tribology
- CFD
- Energy Conservation
- Alternate Energy Sources
- **Hybrid Fuels**
- Advances in IC Engines
- Vehicle Dynamics
- Aerodynamics
- Advanced Manufacturing Techniques
- Advanced Engineering Materials
- Supply Chain Management
- Business Process Re-engineering
- Six-Sigma Technique
- Lean Manufacturing Technique
- Just-in-Time Technique
- Agile Manufacturing
- Value Engineering
- Reliability Engineering

- Any other topic related to Design/Thermal/Industrial/Production Engineering

The student will deliver a power point presentation for about 30 minutes in the seminar on any of the above topics. This will be followed by question answering session for about 10 minutes. The questions on the seminar topic will be asked by the teacher concerned and class students. The students will also prepare a detailed report in MS word and after spiral binding will submit it to the teacher concerned. The report is to be submitted at least one week prior to the presentation. The grades/awards will be given according to the student's presentation, report submitted, and answering of questions asked after the presentation.