DR. K N MODI UNIVERSITY,
NEWAI, TONK, RAJASTHAN

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS WITH STUDY & EVALUATION
SCHEME

M.TECH. (AUTOMOBILE ENGINEERING)

W.E.F. SESSION 2020-21
## DR. K. N. MODI UNIVERSITY
Study and Evaluation Scheme
M.Tech. (Automobile Engineering) I semester
Effective from session 2020-21

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### M.Tech. (Automobile Engineering) III Semester

**Effective from session 2020-21**

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### M.Tech. (Automobile Engineering) IV Semester

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**DR. K. N. MODI UNIVERSITY**

Study and Evaluation Scheme

M.Tech. (Automobile Engineering) III Semester

M.Tech. (Automobile Engineering) IV Semester
01MTAE-101 Automotive Engines and Accessories

UNIT I ENGINE BASIC THEORY
Engine types - operating cycles of SI and CI Engines - Engine design and operating parameters – Two and four stroke engines - Typical performance curves for automobile engines- two stroke engine - performance and pollution aspects.

UNIT II FUEL SUPPLY, IGNITION SYSTEM

UNIT III COOLING AND LUBRICATING SYSTEM
Air cooling and water cooling – thermosyphon cooling, forced cooling systems. Fins and radiator - design aspects. Theory of lubrication — types of lubrication, splash lubrication system, petroil lubrication system, forced feed lubrication system.

UNIT IV AIR MOTION, COMBUSTION AND COMBUSTION CHAMBERS

UNIT V NEW ENGINE TECHNOLOGY

TEXTBOOK

REFERENCES:
01MTAE-102 QUALITY ENGINEERING

Unit -1
Introduction to Quality, Definitions, Aspects of Quality, Challenges to Quality concepts, Quality Specifications.

Unit -2

Unit-3

Unit-4
Just-In-Time : Introduction, Lean Production and JIT, Concept of JIT, Waste reduction and Variability Reduction, Push Versus Pull system, Little JIT and big JIT, Importance of JIT

Unit-5
Total Quality Management in Services : Introduction, Quality In Services, Difference Between Goods and services, Service Quality, Dimensions of quality

References
1. Quality system by Dr Suresh Dalela
2.Total Quality Management by K Sridhara Bhat
01MTAE-103 Advanced Automotive Transmission

UNIT I CLUTCH AND GEAR BOX
Requirement of Transmission system. Different types of clutches: Principle, construction and operation of friction clutches. Objective of the gear box. Problems on performance of automobile such as Resistance to motion, Tractive effort, Engine speed & power and acceleration. Determination of gear box ratios for different vehicle applications. Different types of gear boxes.

UNIT II HYDRODYNAMIC DRIVES

UNIT III AUTOMATIC TRANSMISSION
Ford – T model gear box, Wilson gear box- Cotal electric transmission– Hydraulic control systems of automatic transmission.

UNIT IV HYDROSTATIC DRIVE AND ELECTRIC DRIVE

UNIT V AUTOMATIC TRANSMISSION APPLICATIONS

TEXTBOOK:

REFERENCES:
01MTAE-104 Alternative Fuels & Combustion

UNIT I ALCOHOLS, NATURAL GAS, LPG, HYDROGEN, BIO-GAS

UNIT II COMBUSTION STOICHIOMETRY
Combustion equation for hydrocarbon fuels – minimum air required for combustion – excess air supplied, conversion of volumetric analysis to mass analysis. Simulation, advantages of computer simulation, step – by – step approach, reactive processes, heat reaction, measurement of URP, measurement of HRP.

UNIT III ADIABATIC FLAME TEMPERATURE
Introduction, complete combustion C/H/N/O/ systems, constant – volume adiabatic combustion, constant – pressure adiabatic combustion, calculation of adiabatic flame temperature, isentropic changes of state. SI Engine simulation with air as working medium, deviation between actual and ideal cycle.

UNIT IV Combustion & Heat Transfer in IC Engine
Premixed and diffusion combustion process in IC engines and gas turbines. First and Second Law of Thermodynamics applied to combustion- combustion Stoichiometry- chemical equilibrium, spray formation and droplet combustion, Heat transfer and Engine Balance, measurement of Instantaneous heat transfer rate, heat transfer modeling, radiative heat transfer.

UNIT V Chemical Kinetics of Combustion & FLAMES

TEXTBOOK:
01MPAE-101 Engine and Chassis Lab

PRACTICAL /LAB WORK

STUDENT IS REQUIRED TO SUBMIT A JOURNAL/REPORT FOR THE SAME

Assembling and dismantling of the following

(i) SI-Hyundai engine.
(ii) CI-Ashok Leyland engine
(iii) V-8 Ford engine
(iv) Single plate, Diaphragm Clutch.
(v) Constant mesh, Sliding mesh gear box
(vi) Transfer case
(vii) Differential
(viii) Front axle, Rear axle
(ix) Brakes system
(x) Steering system

01MPAE-102 CAD Laboratory

02MTAE-201 Vehicle Dynamics

UNIT I BASIC OF VIBRATION


UNIT II TYRES

Tire forces and moments, rolling resistance of tires, relationship between tractive effort and longitudinal slip of tyres, cornering properties of tyres, ride properties of tyre.

UNIT III PERFORMANCE CHARACTERISTICS OF VEHICLE


UNIT IV HANDLING CHARACTERISTICS OF VEHICLES

Steering geometry. Steady state handling characteristics. Steady state response to steering input. Transient response characteristics. Directional stability of vehicle.

UNIT V DYNAMICS OF SUSPENSION SYSTEM


TEXTBOOK:

REFERENCES:
02MTAE-202 Automotive Electrical and Electronics Control

UNIT I BATTERIES AND STARTING SYSTEM


UNIT II CHARGING SYSTEM, LIGHTING SYSTEM AND ACCESSORIES


UNIT III ELECTRONIC IGNITION AND INJECTION SYSTEMS


UNIT IV SENSORS IN AUTOMOBILES

Basic sensor arrangement. Types of sensors – Oxygen sensor, fuel metering/Vehicle speed sensor, mass air flow sensor, temperature sensor, altitude sensor, pressure sensor and detonation sensor. Various actuators and its application in automobiles.

UNIT V MICROPROCESSOR IN AUTOMOBILES

Microprocessor And Microcomputer controlled devices in automobiles such as instrument cluster, Voice warning system, Travel information system, Keyless entry system, Automatic Transmission. Environmental requirements (vibration, Temperature and EMI).

TEXTBOOK:

REFERENCES:
02MTAE203 Advance Operation Research

Unit -1

Linear Programming Introduction, applications of linear programming method, Simplex method, Big M method

Unit-2

The Transportation Model Introduction to the model, Assumptions in the transportation model, Transportation Models (Minimizing and Maximizing Cases) – Balanced and unbalanced cases – Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogel's approximation methods. Check for optimality. Solution by MODI / Stepping Stone method. Cases of degeneracy

Unit-3

The assignment model Mathematical Representation of assignment model, Solution of the assignment model, Hungarian method for solution of assignment problems.

Unit-4

Queuing model Characteristics of Queuing models, System and surrounding, Customer attitude, Representation of Queuing Model, Kendal & LEE notations,(M/M/M): (FIFO/~/~) model

Unit-5

Inventory Models Inventory cost, Inventory control problems, Classical EOQ model, Robustness, EOQ with price Break, Production or Build –up model.

REFERENCES


MMAE-204 Automobile Design

UNIT I


UNIT II

Design procedure of theoretical analysis, design considerations, material selection & actual design of components – cylinder block design, cylinder head design & piston pin design, piston ring design, connecting rod design, crank shaft design, flywheel design, design of valve mechanism.

UNIT III

Engine balancing, firing order, longitudinal forces, transverse forces, pitching moments, yawing moments, Engine layout, major critical speed & minor critical speed, design of engine mounting, design of cooling system, design principals of exhaust & inlet systems.

UNIT IV

Determination of engine power. Engine selection, swept volume, stroke, bore & no. of cylinders, arrangement of cylinder stroke to bore ratio, Primary design calculation of major dimensions of fuel injection system.

UNIT V

Basic concepts of CAD: Introduction, Graphics Standards, Two Dimesional transformation, Three Dimesional transformation Three Dimensional Geometric Transformation, Multiple Transformations, Rotation about an arbitrary axis in space, Matrix equations for Orthographic Projection.

Reference Books
2. Engine design – Giles J.G., Lliffe Book Ltd.
5. I.C.engine – Litchy
6. SAE Handbooks
01MPAE 201- Design Practice Lab

PRACTICAL /LAB WORK
STUDENT IS REQUIRED TO SUBMIT A JOURNAL/REPORT FOR THE SAME

Design of automobile components:
1 Chassis
2 Frame
3 Axle
4 Suspension
5 Cylinder
6 Piston
7 Connecting rod.
8 Valves
9 Crank shaft
10 Cam shaft

REFERENCES:
1 Engine design – Giles J.G., Lliffe Book Ltd.
2 Engine Design – Crouse, Tata Mcgraw Publication, Delhi.
3 I.C. Engine by Maleev V.L., Mcgeaw hill Book, co.

01MPAE 202- ENGINES TESTING LAB

1. Constant speed and variable speed performance tests on SI and CI engines and comparison of their performance parameters like specific fuel consumption.

2. Motoring and Retardation tests on CI engine to determine friction power

01MTAE-301 Vehicle Safety & Maintenance

UNIT I SAFETY CONCEPTS

Design of the body for safety, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction. Active safety: driving safety, conditional safety, perceptibility safety, operating safety- passive safety: exterior safety, interior safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

UNIT II SAFETY EQUIPMENTS

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety, antiskid braking system, regenerative braking system, speed control devices.

UNIT III COLLISION WARNING, COMFORT AND CONVENIENCE SYSTEM

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions, driver fitness detection. Steering and mirror adjustment, central locking system, Garage door opening system, tyre pressure control system, rain sensor system, environment information system, manual and automated wiper system, satellite control of vehicle operation for safe and fast travel.

UNIT IV MAINTENANCE TOOL, SHOP, SCHEDULE, RECORDS


UNIT V POWER PLANT REPAIR AND OVERHAULING

Unit I: Research Methodology: Introduction


Unit II: Defining The research

What is research problem, Selecting the problem, Necessity of defining the problem., Technique involved in defining the problem

Unit III: Sampling Design

Census and Sample Survey, Implications of sample Design, Steps in Sampling Design, Criteria of selecting a sample size, characteristics of good sample size, different types of sample design. How to select a random sample, random sample from an infinite universe.

Unit IV: Chi-Square Test & ANOVA Test

Chi-square Test for comparing variance, chi square as non-parametric test, condition for the application of $\chi^2$ Test, Steps involved in applying $\chi^2$ Test, Alternative formula , Yates Correction , Analysis of variance(ANOVA) , The basic principle of ANOVA.

UNIT-V


References:

Module 1: Evaluation as practice. 7.5 hp Module 1 of the course studies evaluation as a social phenomenon, as practice and as a skill. Topics covered in this part of the course include: What is policy and programme evaluation? How does evaluation differ from research? Module 2: The evaluation society and evaluation use, 7.5 hp Module 2 of the course addresses the following questions: What kind of problems are professional evaluators often confronted with in the course of their work? How are evaluations used? How can we assess the quality of evaluations (meta-evaluation).

Study concentrated on syllabus evaluation carried out by inside and outside evaluators at the end of the semester [9]. First, an inside evaluator (an English teacher). This article shows how criteria can be developed for evaluating English language textbooks. It presents a scheme for evaluation which can be used to draw up a checklist of items relevant to second (or foreign) language teaching. Instructions for using the checklist are given as a way of suggesting how teachers can evolve their own criteria for different situations.

View. The syllabus for JEE Main Exam is on similar lines with that of Class XII of CBSE. Along with that, a few additional topics from Class XI are also included in the syllabus when it comes to Paper I of JEE Mains. Ques. Is JEE Main tough? The entire syllabus has to be studied by the candidates to ensure good ranks in the entrance examination. The important topics for JEE Main 2021 Paper 2 are listed below: Harmony, Colour texture, and Contrast.