



UTTARAKHAND TECHNICAL UNIVERSITY
Program: B. Tech- AUTOMOBILE ENGG.

Year:3 Session: 2011 – 2012

Scheme and Evaluation Pattern

UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech- AUTOMOBILE ENGG.

S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
Semester:5 th										
Theory										
1.	TME – 502	Machine Design I	3	1	0	30	20	50	100	150
2.	TME– 503	Dynamics of Machine	3	1	0	30	20	50	100	150
3.	TME 504	Manufacturing Science II	3	1	0	30	20	50	100	150
4.	EAU – 504	Automotive Transmission	3	1	0	30	20	50	100	150
5.	TME– 505	Heat and Mass Transfer	3	1	0	30	20	50	100	150
6.	TCS – 507	Concepts Of Programming and OOPS	2	1	0	15	10	25	50	75
Practical/Design										
1.	PME-551	Theory of Machine and Design Lab	0	0	2	0	0	25	25	50
2.	PAU-552	Auto Mobile Engg. Lab I	0	0	2	0	0	0	25	25
3.	PME-555	Heat and Mass Transfer Lab	0	0	2	0	0	25	25	50
4.	PAU-556	Discipline	0	0	2	0	0	50	0	50
Semester: 6 th										
Theory										
S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
1.	TME – 601	Operation Research	3	1	0	30	20	50	100	150
2.	TME- 602	Machine Design II	3	1	0	30	20	50	100	150
3.	EAU – 603	Automotive Engines and Components	3	1	0	30	20	50	100	150
4.	EAU– 604	Automotive Electrical And Electronic Systems	3	1	0	30	20	50	100	150
5.	EAU – 605	Automotive Fuels and Combustion	3	1	0	30	20	50	100	150
6.	THU – 608	Principles of Management	2	1	0	15	10	25	50	75
Practical/Design										
1.	PAU-651	Auto Mobile Engg. Lab II	0	0	2	0	0	25	25	50
2.	PAU652	Engine Testing Lab	0	0	2	0	0	25	25	50
3.	PAU-655	Fuel Testing Lab	0	0	2	0	0	0	25	25
4.	PAU-656	Discipline	0	0	2	0	0	50	0	50

TME-504 MANUFACTURING SCIENCE-II

L T P
3 1 0

Unit-I

A Metal Cutting and Machine Tools

Metal Cutting-

Mechanics of metal cutting. Geometry of tool and nomenclature .ASA system Orthogonal vs. oblique cutting. Mechanics of chip formation, types of chips. Shear angle relationship. Merchant's force circle diagram. Cutting forces, power required. Cutting fluids/lubricants. Tool materials. Tool wear and tool life. Machinability. Brief introduction to machine tool vibration and surface finish. Economics of metal cutting. **8**

Unit-II

Machine Tools

- (i) Lathe : Principle, types, operations, Turret/capstan, semi/Automatic, Tool layout. **2**
- (ii) Shaper, slotter, planer : operations & drives. **1**
- (iii) Milling : Milling cutters, up & down milling. Dividing head & indexing. Max chip thickness & power required. **2**
- (iv) Drilling and boring : Drilling, boring, reaming tools. Geometry of twist drills. **2**

Unit-III

Grinding & Super finishing

- (v) Grinding : Grinding wheels, abrasive, cutting action. Grinding wheel specification. Grinding wheel wear - attritions wear, fracture wear. Dressing and Truing. Max chip thickness and Guest criteria. Surface and Cylindrical grinding. Centerless grinding. **4**
- (vi) Super finishing : Honing, lapping, polishing. **1**

Limits, Fits & Tolerance and Surface-roughness:

Introduction to Limits, Fits, Tolerances and IS standards, and surface-roughness. **3**

Unit-IV

B. Metal Joining (Welding)

Survey of welding and allied processes. Gas welding and cutting, process and equipment. Arc welding : Power sources and consumables. TIG & MIG processes and their parameters. Resistance welding - spot, seam projection etc. Other welding processes such as atomic hydrogen, submerged arc, electroslag, friction welding. Soldering & Brazing . **8**

Thermodynamic and Metallurgical aspects in welding and weld,. Shrinkage/residual stress in welds. Distortions & Defects in welds and remedies. Weld decay in HAZ. **3**

Unit-V

C. Introduction to non conventional Manufacturing Process

Benefits, application and working principle of EDM, ECM, LBM, EBM, USM. AJM, WJM. Similarly, non-conventional welding application such as LBW, USW, EBW, Plasma arc welding, Explosive welding. HERE- Explosive Forming

6

Books

1. Manufacturing science by Ghosh and Mullick
2. Production Technology by R.K. Jain
3. Modern Machining Processes by P.C. Pandey & H.S. Shan
4. Manufacturing science by Degarmo
5. Manufacturing Technology Metal Cutting & Machine Tools by PN Rao, TMH
6. Manufacturing Technology Foundary, Forming & Welding by PN Rao, TMH

TME-502

L T P
3 1 0

MACHINE DESIGN -I

UNIT-I

Introduction, Definition, Methods, standards in design & selection of preferred size. 3
Selection of materials for static & fatigue loads, Materials for components subjected to creep, BIS system of designation of steels, steels, plastics & rubbers. AISI (American Iron & Steel Institution), ASTM rubber testing methods. 4

UNIT-II

Design against static load.

Modes of failure, Factor of safety, stress-strain relationship, principal stresses, theories of failure 4

Design against fluctuating load stress concentration, stress concentration factors, Fluctuating/alternting stresses, fatigue failure, endurance limit, design for finite & infinite life,

Soderberg & Goodman criteria. 4

UNIT-III

Joints

Welded joint, screwed joints, ecentric loading of above joints, design for fatigue loading. 3

Shaft, keys & coupling.

Design against static and fatigue loads, strength & rigidity design, Selection of square & flat keys & splines, rigid & flexible couplings. 4

UNIT-IV

Mechanical springs

Design of Helical and leaf springs, against static & fatigue loading. 4

Design analysis of Power Screws

Form of threads, square threads, trapezoidal threads, stresses in screw, design of screw jack. 4

UNIT-V

Introduction to Product Development & Design Process

Definition of Design, Design Process, Need Analysis, Need based developments, Design by

Evolution, Technology based developments, Examples. Case Studies. Brain-storming. 8

Books

1. Design of M/c Elements : Bhandari, TMH
2. Machine design : Sharma & Agarwal, Kataria
3. M/C Design : Maleev & Hartman,
4. Machine Design SI edition by Shigley, Mcgraw Hill

TME-503

DYNAMICS OF MACHINES

UNIT-I

Force Analysis, Turning Moment & Fly wheel:

Static force analysis of linkages, Equivalent offset inertia force, Dynamic analysis of slider crank & Bar mechanism. Piston and Crank effort, Inertia, Torque, Turning moment diagrams, Fluctuation of energy, Flywheel.

4

UNIT-II

Balancing of machines:

Static and dynamic balancing, Balancing of rotating and reciprocating masses, Primary and secondary forces and couples.

5

UNIT-III

Friction:

Pivot and collar friction, Friction circle, Single plate, Multiplate and Cone clutches, Michelle & Kingsbury thrust bearing and rolling contact bearing, Belts and pulleys, Flat and V-belts, Design and selection.

7

Brakes and Dynamometers (Mechanical Type):

External and internal shoe brakes, Band and Block brakes, Hydraulic brakes, Absorption and Transmission dynamometers.

7

UNIT-IV

Governors:

Dead weight and spring loaded governors, Sensitivity, Stability, Hunting, Isochronism, Effort and Power, Friction and Insensitivity, Introduction to inertia governors.

6

UNIT - V

Gyroscopic Motion:

Principles, Gyroscopic acceleration, Gyroscopic couple and Reaction. Effect of gyroscopic couple upon the stability of aeroplanes, ship, two & four wheelers.

4

Books and References

- 1.Theory of Machine: Thomas Bevan (ELBS/CBS pub. New Delhi)
- 2.Theory of Machine: S.S.Ratan (TMH)
3. Mechanisms & Dynamics of Machines-Mabie

UNIT 1:

Transmission requirements: requirements of transmission system, general arrangement of power transmission, general arrangement of rear-engine vehicle with live axles, general arrangement of dead-axle and axles transmission; four-wheel-drive transmission. 5

Unit 2:

Clutches :Requirements of clutches, principle of friction clutches, types of clutches and materials used-cone, single-plate, diaphragm-spring, multi-plate, centrifugal, over-running and ferlecelectromagnetic clutch. 6

Unit 3: Gear box: Need of gear boxes, types- sliding mesh, constant mesh and epicyclic, gear boxes; synchronizers: principle, and design of gear box; Hydrodynamic drive: Advantages and limitations, principle of fluid coupling, constructional details, torque-capacity performance characteristics, drag torque, methods of minimizing drag torque; Torque converter: performance characteristics; single, , converter-coupling-performance characteristics, 10

Unit-4:

Transmission systems-Drive line: Definition, forces & torques acting; types of drives-Hotchkiss, torque tube & radius rod drives; components- propeller shaft, slip joint, universal joints & constant velocity universal joints; front wheel drive; Final drive: definition; types- worm-wheel, straight-bevel gear, spiral-bevel gear & hypoid-gear drives; double-reduction & twin-speed final drives 7

Differential:

Function, principle, construction and working; non-slip differential; differential lock; rear axle- loads acting & types; multi-axled vehicles. 5

Unit 5:

Automatic transmission: Hydraulic control system of automatic transmission; Electric drive: advantages and limitations, principle of , modern electric drive for buses; performance characteristics. 7

References:

- 1 Heldt P.M.; Torqueconverters; Chilton Book Co.
- 2 Giri NK; Automobile Engineering; Khanna Publisher
- 3 .Newton, Steeds & Garret; Motor Vehicles; B.H. Publication.
4. Judge, A.W., Modern Transmission Systems, Chapman & Hall Ltd.
5. Check Chart; Automatic Transmission; Harper & Row Publication.

HEAT & MASS TRANSFER

UNIT-1

Introduction to Heat Transfer:

Concepts of the mechanisms of heat flows: conduction, convection and radiation; effect of temperature on thermal conductivity of materials; introduction to combined heat transfer mechanism.

2

Conduction :

One-dimensional general differential heat conduction equation in the rectangular, cylindrical and spherical coordinate systems; initial and boundary conditions.

3

Steady State one-dimensional Heat conduction :

Composite Systems in rectangular, cylindrical and spherical coordinates with and without Energy generation; thermal resistance concept; Analogy between heat and electricity flow; thermal contact resistance; critical thickness of insulation.

3

UNIT-2

Fins of uniform cross-sectional area; errors of measurement of temperature in thermometer wells

2

Transient Conduction:

Transient heat conduction Lumped capacitance method, Time constant unsteady state heat conduction in one dimension only, Heisler charts.

4

UNIT-3

Forced Convection:

Basic concepts; hydrodynamic boundary layer; thermal boundary layer, flow over a flat plate; flow

across a single cylinder and a sphere; flow inside ducts; empirical heat transfer relations; relation

between fluid friction and heat transfer; liquid metal heat transfer.

4

Natural Convection :

5

Physical mechanism of natural convection; buoyant force; empirical heat transfer relations for natural

convection over vertical planes and cylinders, horizontal plates and cylinders, and sphere. 3

UNIT-4

Thermal Radiation :

Basic radiation concepts; radiation properties of surfaces; black body radiation laws; shape factor;

black-body radiation exchange; Radiation exchange between diffuse nonblackbodies in an enclosure;

radiation shields; solar radiation.

7

UNIT-5

Heat Exchanger :

Types of heat exchangers; fouling factors; overall heat transfer coefficient; logarithmic mean

temperature difference (LMTD) method; effectiveness-NTU method; compact heat exchangers. 4

Condensation And Boiling :

Introduction to condensation phenomena; heat transfer relations for laminar film condensation on vertical surfaces and on a horizontal tube; Boiling modes pool boiling, curve, forced convective boiling. 3

Introduction To Mass Transfer :

Introduction; Fick's law of diffusion; steady state equimolar counter diffusion; steady state diffusion through a stagnant gas film. 2

Books

1. Elements of Heat transfer by Bayazitoglu & Ozisik, McGraw-Hill Book Company.
2. Heat Transfer By J.P. Holman, McGraw-Hill International edition.
3. Schaum's outline of Heat Transfer by Pitts & Sisson McGraw-Hill International edition.
4. Principles of Heat Transfer by Frank Kreith, McGraw-Hill Book co.

TCS-507 CONCEPTS OF PROGRAMMING AND OOPS

L T P
2 1 0

UNIT 1

UTILIZATION: Developer fundamentals such as editor, integrated programming environment, UNIX shell, modules, libraries.

PROGRAMMING FEATURES: Machine representation, primitive types, arrays and records, objects, expressions, control statements, iteration, procedures, functions, and basic I/O.

APPLICATIONS: Sample problems in engineering, science, text processing, and numerical methods. 5

UNIT 2

PROBLEM SOLVING WITH ALGORITHMS- Programming styles – Coding Standards and Best practices - Introduction to C Programming, Testing and Debugging. Code reviews, System Development Methodologies – Software development Models, User interface Design – introduction – The process – Elements of UI design & reports. 5

UNIT 3

OBJECTED ORIENTED CONCEPTS – object oriented programming, UML Class Diagrams– relationship – Inheritance – Abstract classes – polymorphism, Object Oriented Design methodology - Common Base class, Alice Tool – Application of OOC using Alice tool. 4

UNIT 4

RDBMS- DATA PROCESSING – the database technology – data models, ER modeling concept – notations – Extended ER features, Logical database design – normalization, SQL – DDL statements – DML statements – DCL statements, Writing Simple queries – SQL Tuning techniques – Embedded SQL – OLTP 4

TEXTBOOK:

C++ Program Design: An introduction to Programming and Object-Oriented Design, 3rd Edition, by Cohoon and Davidson, Tata McGraw Hill. 2003. 5

OTHER REFERENCES (Not required reading):

Thinking in C++ 2nd Edition by Bruce Eckel(available online)
G. Dromey, How to Solve It by Computer, Prentice-Hall, Inc., Upper Saddle River, NJ, 1982.
Polya, G., How to Solve It (2nd ed.), Doubleday and co. (1957).
Let Us C. Yashwant Kanetkar. Allied Publishers, 1998.
The Java Tutorial, Sun Microsystems. Addison-Wesley, 1999.

PME 551

L T P
0 0 2

THEORY OF MACHINE & DESIGN LAB

(Say min 3 out of these)

1. Design & drawing of a cotter joint.
2. Design & drawing of a knuckle joints.
3. Design & drawing of a simple screw jack.
4. Design of shaft for different loading conditions.
5. Design & drawing of rigid coupling(flanged type).
6. Design & drawing of a leaf spring for an automobile.
7. Design & drawing of a helical spring for a given application

Note -

1. Students may be advised to use design data book for design.
2. Drawing shall be made wherever necessary on small drawing sheets.

Min. 5 out of following (or such) experiments to be done:

1. Study of simple linkers/models/mechanisms.
2. Exp. on Velocity acceleration.
3. Exp. on cam.
4. Exp. on Governor.
5. Exp. on critical speed of shaft (whirling of shaft)
6. Exp. on Gyroscope
7. Exp. on Balancing (static & dynamic)
8. Exp. on 4-bar mechanism
9. Exp. on Gears (tooth profile, interference etc.)
10. Exp. on Gear trains.
11. Exp. on Mechanism
15. Exp. on Vibration (spring)

PAE-552

L T P
0 0 2

AUTOMOBILE ENGG. LAB. -I

1. Study of hand tools- sketching, materials used and their applications.
2. Writing technical specifications and description of all types of automobile engines.
3. Study of traffic rules as per M.V. Act 1988 and driving practice of four wheel vehicle.
4. Trouble shooting charts for all engine components.
5. Note the specifications of given engines and component standard dimensions. Dismantle & assemble of engine components of SI and CI engines (Two stroke and four stroke engines) of any commercial vehicles, using special tools needed. Note procedure of dismantling & assembly; identify the major components, noting their functions & materials used. Measurement & comparison of major components dimension with standard specifications. Inspection for wear and tear, crack, breakdown. Identify the service requirements of engine, such as decarburizing, degreasing, sparkplug cleaning, fuel injector cleaning, etc.
6. Compression test, vacuum test on diesel and petrol engines.
7. Study (Dismantling & assembly): Different carburetors, fuel injection pumps, injectors, fuel tanks, fuel filters, fuel pumps, turbo-chargers, cooling systems and lubricating systems. Identify location of above components in a vehicle and note their functions along with the brand names.

PME-555

HEAT & MASS TRANSFER - LAB

(min 8 experiment of the following or such experiment)

1. Conduction - Composite wall experiment
2. Conduction - Composite cylinder experiment
3. Convection - Pool Boiling experiment
4. Convection - Experiment on heat transfer from tube-natural convection.
5. Convection - Heat Pipe experiment.
6. Convection - Heat transfer through fin-natural convection .
7. Convection - Heat transfer through tube/fin-forced convection.
8. Any experiment - Such as on Stefan's Law, on radiation determination of emissivity, etc.
9. Any experiment - Such as on solar collector, etc. on radiation
10. Heat exchanger - Parallel flow experiment
11. Heat exchanger - Counter flow experiment
12. Any other suitable exp such as on critical insulation thickness.
13. Conduction - Determination of thermal conductivity of fluids.
14. Conduction - Thermal Contact Resistance Effect.

TAE-601 :OPERATIONS RESEARCH**Unit-I****Linear Programming-**

Introduction & Scope, Problem formulation, Simplex methods, primal & dual problem 8

Unit-II

Transportation & Assignment problems. 4

Unit-III**Decision theory-**

Decision under various conditions. 4

Game Theory-

Minimax & maximum strategies. Application of linear programming. 4

Unit-IV**Stochastic inventory models-**

Single & multi period models with continuous & discrete demands, 8

Unit-V**Simulations-**

Simulation V/S mathematical modeling, Monte carlo simulation, simulation languages, 4

Queing models-

Introduction Model types, M.M. 1 & M/M/S system cost consideration 4

Referance Books

Operations Research by : Wangner

Production Planning of Operation Management : by Buffa.

Optimization Techniques by : S.S. Rao.

Operations Research by : Taha

TME-602 : MACHINE DESIGN-II**L T P
3 1 0****UNIT I**

Spur Gears Tooth forms, System of gear teeth, contact ratio, Standard proportions of gear systems, Interference in involute gears, Backlash, Selection of gear materials, Gear manufacturing methods, Design considerations, Beam strength of gear tooth, Dynamic tooth load, Wear strength of gear tooth, Failure of gear tooth, Design of spur gears, AGMA and Indian standards. **5**

Helical Gears Terminology, Proportions for helical gears, Beam strength and wear strength of helical gears, herringbone gears, crossed helical gears, Design of helical gears. **3**

Worm Gears Types of worms, Terminology, Gear tooth proportions, Efficiency of worm gears, Heat dissipation in worm gearing, Strength and wear tooth load for worm gears, Design of worm gearing **3**

UNIT II

Sliding Contact Bearing Types, Selection of bearing, Plain journal bearing, Hydrodynamic lubrication, Properties and materials, Lubricants and lubrication, Hydrodynamic journal bearing, Heat generation, Design of journal bearing, Thrust bearing-pivot and collar bearing, Hydrodynamic thrust bearing, **5**

Rolling Contact Bearing Advantages and disadvantages, Types of ball bearing, Thrust ball bearing, Types of roller bearing, Selection of radial ball bearing, Bearing life, Selection of roller bearings, Dynamic equivalent load for roller contact bearing under constant and variable loading, Reliability of Bearing, Selection of rolling contact bearing, Lubrication of ball and roller bearing, Mounting of bearing **6**

UNIT III**IC ENGINE PARTS**

Selection of type of IC engine, General design considerations, Design of Cylinder and cylinder head; Design of piston, piston ring and gudgeon pin; Design of connecting rod; Design of centre crankshaft **6**

References:

- 1. Mechanical Engineering Design – Joseph E. Shigely, McGraw Hill Publications**
- 2. Design of Machine Memembers-Alex Valance and VI Doughtie, McGraw Hill Co.**
- 3. Machine design-M.F. Spott, Prentice Hall India**
- 4. Machine Design-Maleev and Hartman, CBS**
- 5. Machine design -Black & Adams, Mc Graw Hill**
- 6. Machine Design-Sharma and Agrawal, S.K. Katara & Sons**
- 7. Design of Machine Elements-V.B. Bhandari, Tata McGrawHill Co.**

UNIT-I

Review of IC engines,

Principles of engine operation (SI & CI), Port timing diagrams.

Types - Three port engine, Separate pumps or blowers, Symmetrical & unsymmetrical timing, Cross flow, loop flow & uniflow type Scavenging systems. Scavenging Process – Pre blow down, Blow down, Scavenging, Additional Charging. Theoretical Scavenging processes, Scavenging parameters, Comparison of Different Scavenging Systems; port design, scavenging pumps. Relative merits & demerits of petrol & diesel engines.

7

UNIT II

Engine components

- Classification/types, function, materials, construction details, manufacturing, Troubles & Remedies and Design of major dimensions of the following engine components

Cylinder heads & Cylinder Block

Cylinder heads, Gaskets, cylinder wear, water jacket, Cylinder liners, and valve seats. Production of engine block – casting, cleaning, treatment, machining operations and transfer machines

3

Crank Case, Manifolds and Mufflers

Crank Case – General form of crank case, oil sumps and cooling features, flywheel mountings, Engine mountings, Front & Rear mountings. Manifolds and Mufflers - inlet and exhaust manifolds, mixture distribution, heating by exhaust gas, dual manifolds, General Design of Manifolds, effect of firing order,

Mufflers, general design.

3

Piston, piston rings, piston pin

Piston Temperatures, piston slap, compensation of thermal expansion in pistons. Piston Rings, forms of gap, stresses in piston rings, ring collapse, heat treatment, piston ring selection, shape. Piston pin, locking of piston pins, length of piston.

3

UNIT III

Connecting rod

Length of rod, Cross section, Buckling, Drilled connecting rods, piston pin bearing, offset connecting rods, effects of whipping, bearing materials, lubrication .

2

Crank shaft

Balance weights, local balance, Crankshaft proportions, oil holes drilled in crank shafts, balancing , vibration dampers, firing order, bearings, lubrication.

2

Valve and valve mechanism

No. of Valves per cylinder, Angle of seat, Operating Conditions, operating temperatures, valve cooling, Sodium cooled valves, Valve rotators, valve seats, valve guides, , valve springs, valve clearance, valve timing, OHV, OHC, dual valves, types of valve operating mechanisms. Valve train component details, Camshaft,- drives of cams, cam types, tappets,-automatic zero clearance tappets, push rods, rocker arms & rocker Shaft.

4

REFERENCE BOOKS:

1. A course in I.C. Engine - Mathur & Sharma , Dhanpat Rai & Sons, Delhi, 1994
2. Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 2002
3. Automobile Engineering Vol. II - Kirpal Singh, Standard publications, New Delhi, 2005

UNIT-1 Storage

Battery:

Principle of lead acid cells, plates and their characteristics containers and separators, electrolyte and their preparation, voltmeter, effect of temperature on electrolyte, its specific gravity, capacity and efficiency, methods of charging from D.C. mains, defects and remedies of batteries, care of idle and new batteries.

Recent development in batteries 6

Generator/ Alternator:

Principle of generation of direct current, generator details, shunt, dynamos, armature reaction, action of three brush generator and battery in parallel, setting of third brush, voltage and current regulators, cutout -

construction, working and adjustment. Construction of A.C. systems. 6

Starter Motor & Drives:

Battery motor starting system, condition at starting, behaviour of starter during starting series motor and its characteristics, consideration affecting size of motor, types of drives, starting circuit. 4

UNIT-II

Ignition systems:

Ignition fundamentals, Types of solid state ignition systems, components, construction And operating parameters high energy ignition distributors, Electronic spark timing And control. 4

UNIT-III

Wiring and Lighting system:

Earth return and insulated systems, 6volts and 12 volts system, fusing of circuits, low and high voltage automobile cables, diagram of typical wiring system. Principle of automobile illumination, head lamp mounting and construction, sealed beam auxiliary lightings, horn, windscreen-wipers, signaling devices, electrical fuel pump, fuel, oil and temperature gauge(Dash board instruments) 8

UNIT-IV

Engine management Systems:

Combined ignition and fuel management systems. Exhaust emission control, Digital control techniques – Dwell angle calculation, Ignition timing calculation and Injection duration calculation. Complete vehicle control systems, Artificial intelligence and engine management. Hybrid vehicles and fuel cells. 8

UNIT-V

Chassis Electrical systems:

Antilock brakes (ABS), Active suspension, Traction control, Electronic control of automatic transmission, other chassis electrical systems, Central locking, Air bags and seat belt tensioners.

8

REFERENCE BOOKS:

1. Tom Denton, "Automobile Electrical and Electronic systems" SAE publication, 2000.
2. P.M. Kohli, 'Automotive Electrical Equipment', Tata McGraw Hill, New Delhi.
3. Heinz Heisler, Advanced Engine Technology. SAE Publications, 1995

EAU-605AUTOMOTIVE FUELS AND COMBUSTION

L T P
3 1 0

UNIT-1

Energy Sources:

Exhaustible sources - crude oil, Natural gas, Inexhaustible sources - Solar energy, Wind power, Tidal Power, Geo-thermal power. Energy from Bio-gas, Synthetic fuels – Fuel Cells, Hydrogen- only a brief introduction.

3

UNIT-2

Liquid Fuels:

Origin of petroleum, its chemistry, normal paraffin's, isoparaffins, olefins, naphthalene and aromatics. Refining of petroleum: Fractional distillation, Cracking, Reforming process, Thermal reforming, polymerization, alkylation, and isomerisation. Properties and tests : Specific Gravity, viscosity, flash and fire points, calorific value, rating of fuels, vapour pressure, cloud and pour point, annealing point, diesel index, carbon residue and ash content determination

5

UNIT-3

Combustion of Fuels:

Combustion equation, conversion of gravimetric to volumetric analysis. Determination of theoretical minimum quantity of air for complete combustion. Determination of air fuel ratio for a given fuel. Numerical problems, flue gas analysis, gas Chromatograph.

4

UNIT-4

Petrol and Diesel Fuels:

Properties and rating of fuels, chemical energy of fuels, Reaction Equation, Properties of A/F mixture, combustion temp, combustion charts, Lead free gasoline's, low and ultra – low sulphur diesels, LPG, CNG, Alcohols, Biodiesels, Gaseous Fuel Injections, Dual Fueling and Controls – CNG and Gasoline, Hydrogen and Diesel, Alcohols and Diesels etc. ENGINE PERFORMANCE: Performance parameters BHP, FHP, IHP, specific fuel consumption, volumetric efficiency, Thermal efficiency, heat Balance sheet, Testing of Engines, Numerical problems

5

UNIT-5

Cycle Analysis:

Otto, Diesel, Dual, sterling and Brayton cycles, comparison of air standard, fuel air and actual cycles, simple problems on the above topics. Rotary engines. Stirling engine, Stratified charge engine

3

Combustion in S.I Engines

Initiation of combustion, flame velocities, effect of variables on flame propagation, normal and abnormal combustion, knocking combustion, pre-ignition, knock and engine variables, detonation, effects of engine variables on combustion, control of detonation, CFR engine, features and design consideration of

combustion chambers, stratified charge combustion, concepts of lean burn engines, heat release correlations

4

Combustion in C.I. Engines

Various stages of combustion, vaporization of fuel droplets and spray formation, air motion, swirl, squish, tumble flow, velocities, swirl measurement, and delay period correlations, diesel knock and engine variables, features and design considerations of combustion chambers, types, heat release correlations. 3

REFERENCE BOOKS:

- 1.. Fuels & Combustion by S.P. Sharma & Chandra Mohan, Tata McGraw-Hill, New Delhi, 1987
2. John B. Heywood, Internal Combustion Engine Fundamentals, McGraw Hill Book, 1998
3. Obert, E.F., Internal Combustion Engine and Air Pollution, International Text Book Publishers, 1983.
4. Ram lingam, K.K., Internal Combustion Engines, SciTech Publications(India) Pvt. Ltd., 2000.

THU-608 PRINCIPLES OF MANAGEMENT

L T P
2 1 0

UNIT 1

INTRODUCTION TO MANAGEMENT: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system. 4

UNIT 2

MANAGEMENT INFORMATION: Interaction with external environment. Managerial decision making and MIS. 3

UNIT 3

PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating. 3

UNIT 4

MOTIVATION AND PRODUCTIVITY: Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations. Techniques of control. Japanese management techniques. Case studies. 4

References:

1. Peter Drucker, Harper and Row: The Practice of Management.
2. Koontz: Essentials of Management, PHI Learning.
3. Staner: Management, PHI Learning.
4. Daft: Principles of Management, Cengage Learning.
5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.

PAU-651
AUTOMOBILE ENGG. LAB -II

L T P
0 0 2

1. Writing technical specifications and description of all types of chassis and transmission components of automobiles, including body and interiors (two wheeler, four wheeler and heavy vehicle – one each)
2. Trouble shooting charts for major parts like clutch, gear box, differential, brakes, and wheels with tyres, steering system and suspension.
3. Testing and servicing of electrical components like battery, starting system, ignition system, central locking system, lighting system, and alternator. Experiments on microprocessors related to automobiles
4. Dismantle and assemble of major systems (clutch system, Gear boxes, Propeller shaft, Differential, Front and Rear axles, brake system, steering system and suspension system) and identifying remedies (like backlash adjustment, brakes adjustment, bleeding of brakes) for the possible problems based on trouble shooting charts.
5. Draw sketch of seating arrangements, seats for commercial vehicle and study the comfort levels provided for driver and passengers.
6. Draw sketches of different mechanisms of door, seat adjustments mechanisms

PAU-652
ENGINE TESTING LAB

L T P
0 0 2

1. Testing of Single Cylinder, Twin Cylinder and multi cylinder SI / CI engines for performance, calculate BP, Thermal, volumetric efficiencies, and BSFC with emission testing.
2. Study one engine performance by changing parameters like valve timing, ignition timing, carburetor nozzle jet.
3. Conduct Morse test for finding FP, IP, Indicated thermal efficiency and Mechanical efficiency.
4. Study of engine performance using alternate fuels like alcohol blends/ bio diesel / LPG.
5. Performance test on computerized IC engine test rig.
6. Study and testing on MPFI Engine and Variable compression Engine.
7. Tuning of engines. Study and practice on computerized engine analyzer.
8. Exhaust Emission test of Petrol and Diesel engines

PAU-655
FUEL TESTING AND FLUID MECHANICS LAB

1. Determination of Flash and Fire Points of fuels and lubricants
2. Determination of calorific values of solid, liquid and gaseous fuels
3. Determination of viscosity of oils using Redwood, Say bolts and Torsion viscometer.
4. Measurement of areas of irregular figure Using of Planimeters
5. Determination of Carbon residue and Moisture content in a fuel.
6. Determination of cloud and pour points of light, medium and heavy oils.
7. Drawing of Valve and port timing diagram for a given engine.
8. Determination of compression ratio for a given engine.
9. Performance testing of fluid pumps.
10. Performance testing of air blower.
11. Determination of coefficient of discharge of venturi meter, orifice meter.
12. Determination of major and minor losses in pipe flow (bend, sudden expansion, sudden contraction, entry and exit).