

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK (HARYANA)**  
**SCHEME OF STUDIES & EXAMINATION FOR**  
**B. TECH. (AUTOMOBILE ENGINEERING)**  
**SEMESTER-VI**  
**'F' Scheme effective from 2015-16**

Course No.	Course Title	Teaching Schedule				Marks For Class Work	Marks for Examination		Total Marks	Duration of Exam
		L	T	P	TOTAL		Theory	Practical		
AUE 302-F	Automotive Electrical Systems & Electronics	3	1	-	4	50	100	-	150	3
AUE 304-F	Vehicle Body Engineering	3	1	-	4	50	100	-	150	3
AUE 306-F	Two and Three Wheelers	3	1	-	4	50	100	-	150	3
AUE 308-F	Automotive Pollution and Control	3	1	-	4	50	100	-	150	3
AUE 310-F	Quality Control & Reliability Engineering	3	1	-	4	50	100	-	150	3
AUE -404-F	Transport Management and Automobile Industry	3	1	-	4	50	100	-	150	3
AUE 312-F	Automotive Electrical & Electronics Laboratory			2	2	25		25	50	3
AUE 314-F	Engine Testing and Pollution Measurement Laboratory	-	-	2	2	25	-	25	50	3
AUE 318-F	Vehicle Maintenance Laboratory	-	-	2	2	25	-	25	50	3
GPME-302 -F	General Proficiency	-	-	-	-	50	-	-	50	-
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>30</b>	<b>425</b>	<b>600</b>	<b>75</b>	<b>1100</b>	

**Note:**

- 1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
- 2. Each student has to undergo practical training of 6 weeks during Summer Vacation and its evaluation shall be carried out in the VII Semester.**

## **AUE -302 -F AUTOMOTIVE ELECTRICAL SYSTEMS AND ELECTRONICS**

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### **Section -A**

Batteries: Principles and construction of lead-acid battery. Characteristics of battery, rating capacity and efficiency of batteries. Various tests on battery condition, charging methods. Constructional aspect of alkaline battery. Starting System: Condition at starting. Behaviour of starter during starting. Series motor and its characteristics. Principle & construction of starter motor. Working of different starter drive units, care and maintenance of starter motor. Starter Switches.

### **Section -B**

Charging System: Generation of direct current. Shunt generator characteristics. Armature reaction. Third brush regulation. Cut-out. Voltage & current regulators. Compensated voltage regulator alternators principle & constructional aspects and bridge benefits. Ignition Systems : Types, Construction & working of battery coil and magneto ignition systems. Relative merits, Centrifugal and vacuum advance mechanisms, types and construction of spark plugs, electronic ignition systems. Lighting System & Accessories: Insulated & earth return systems. Positive & negative earth systems. Details of head light & side light. Headlight dazzling & preventive methods. Electrical fuel-pump, Speedometer, Fuel, oil & temperature gauges, Horn, Wiper system, Trafficator.

### **Section -C**

Automotive Electronics: Current trends in modern automobiles, Open and close loop systems-Components for electronic engine management. Electronic management of chassis system. Vehicle motion control. Sensors and Actuators: Basic sensor arrangement, Types of sensors such as-Oxygen sensors, Crank angle position sensors-Fuel metering/vehicle speed sensor and detonation sensor-Altitude sensor, flow sensor. Throttle position sensors. Solenoids, stepper motors, and relays.

### **Section -D**

Electronic Fuel Injection and Ignition Systems: Introduction, feedback carburetor systems. Throttle body injection and multi port or point fuel injection., fuel injection systems, Injection system controls. Advantages of electronic ignition systems: Types of solid-state ignition systems and their principle of operation, Contact less electronic ignition system, and electronic spark

timing control. Digital Engine Control System: Open loop and closed loop control systems- Engine cranking and warm up control-Acceleration enrichment-Deceleration leaning and idle speed control. Distributor less ignition-Integrated engine control systems, Exhaust emission control engineering. Electronic dashboard instruments-Onboard diagnosis system, security and warning system.

#### **REFERENCE BOOKS :**

1. Judge. A.W., Modern Electrical Equipment of Automobiles, Chapman & Hall, London, 1992.
2. Young. A.P., & Griffiths. L., Automobile Electrical Equipment, English Language Book Society & New Press, 1990.
3. Vinal. G.W. , Storage Batteries, John Wiley & Sons Inc., New York, 1985.
4. Crouse. W.H. , Automobile Electrical Equipment, McGraw Hill Book Co Inc., New York, 1980
5. Spreadbury. F.G. Electrical ignition Equipment, Constable & Co. Ltd., London 1962.
6. Kholi. P.L., Automotive Electrical Equipment, Tata McGraw-Hill Co. Ltd. New Delhi, 1975.
7. Automotive Hand Book, Robert Bosch, Bently Publishers, 1997.
8. William B. Ribbens, Understanding Automotive Electronics, 5th Edition, Butterworth, Heinemann Woburn, 1998.
- 9 Tom Weather Jr and Cland C. Hunter, Automotive Computers and Control System, Prentice Hall Inc., New Jersey.
10. Young. A.P. and Griffthts. L. Automobile Electrical Equipment, English Language Book Society and New Press.
11. Crouse. W.H., Automobile Electrical equipment, McGraw Hill Book Inc., New York,1955.
12. Robert N Brady Automotive Computers and digital Instrumentation reston Book, Prentice Hall, Eagle Wood Cliffs, New Jersy, 1988.
13. Bechtold, Understanding Automotive electronics, SAE, 1998.
14. T.Mellard Automotive Electronics.

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

#### **Section -A**

Car Body Details: Types: Saloon, Convertibles, Limousine, Estate van, racing and sports car. Visibility: regulations, driver's visibility, test for visibility, Methods of improving visibility and space in cars. Safety: safety design, safety equipments for car. Car body construction.

#### **Section -B**

Vehicle Aerodynamics: Objectives, Vehicle drag and types, various types of forces and moments, Effects of forces and moments, side wind effects on forces and moments, various body optimization techniques for minimum drag. Wind tunnel testing: Flow visualization techniques, scale model testing. Component balance to measure forces and moments.

#### **Section -C**

Bus Body Details: Types, mini bus, single decker, double decker, two level, split level and articulated bus. Bus Body Lay Out: Floor height, engine location, entrance and exit location, seating dimensions. Constructional details: Frame construction, Double skin construction-Types of metal section used-Regulations-Conventional and Integral type construction.

#### **Section -D**

Commercial Vehicle Details: Types of body, Flat platform, drop side, fixed side, tipper body, tanker body. Light commercial vehicle body types, Dimensions of driver's seat in relation to controls, driver's cabin design. Body Materials, Trim And Mechanisms: Steel sheet, timber, plastics, GRP, properties of materials-Corrosion anticorrosion methods, scalation of paint and painting process, body trim items. Body mechanisms.

#### **REFERENCE BOOKS :**

1. Powloski. J. Vehicle Body Engineering, Business Books Ltd., 1989.
2. Giles. J.C. Body construction and design, Illiffe Books Butterworth & Co., 1971
3. John Fenton, Vehicle Body layout and analysis, Mechanical Engg Publication Ltd., London,1982
4. Braithwaite.J.B., Vehicle Body building and drawing, Heinemann Educational Books Ltd., London,1977.

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#### **Section -A**

Power Unit: Two stroke and four stroke SI engine, merits and demerits. Symmetrical and unsymmetrical port timing diagrams. Types of scavenging processes merits and demerits, scavenging efficiency. Scavenging pumps. Rotary valve engine. Fuel system. Lubrication system. Magneto coil and battery coil spark ignition system. electronic Ignition system. Starting system. Kick starter system.

#### **Section -B**

Chassis and Sub-Systems: Mainframe, its types. Chassis and shaft drive. Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension- systems. Shock absorbers. Panel meters and controls on handle bar.

#### **Section -C**

Brake and Wheels: Drum brakes, Disc brakes, front and rear brake links layouts. Spoked wheel, Cast wheel. Disc wheel. Disc types. Tyres & tubes.

#### **Section -D**

Two Wheelers: Case study of major Indian models of motorcycles, SCOOTERS AND MOPEDS. Bajaj, Vespa, Lambretta scooters. Enfield, TVS-Suzuki, Hero-Honda, Yamaha RX-100, Kawasaki Bajaj Motor cycle. Kinetic Spark, Hero Majestic, TVS mopeds. Servicing and maintenance. Three Wheelers: Case study of Indian Models. Front engine and rear engine. Auto rickshaws. Pickup van. Delivery Van and Trailer.

#### **REFERENCE BOOKS :**

1. Irving. P.E., Motor cycle Engineering, Temple Press Book, London, 1992
2. The Cycle Motor Manual, Temple Press Ltd., London, 1990.
3. Encyclopedia of Motorcycling, 20 volumes, Marshall Cavensih, New York and London, 1989.
4. Bryaut. R.V., Vespa Maintenance and Repair series.
5. Raymond Broad, Lambretta – A practical guide to maintenance and repair, 1987

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#### **Section -A**

Introduction: Pollutants-sources-formation-effects-transient operational effects on pollution. SI engine Combustion and Pollutant Formation: Chemistry of SI engine Combustion, HC and CO formation in 4 stroke and 2 stroke SI engines, NO formation in SI Engines, Effect of operating variables on emission formation.

#### **Section -B**

CI engine Combustion and Emissions: Basic of diesel combustion-Smoke emission in diesel engines-Particulate emission in diesel engines. Color and aldehyde emissions from diesel engines, Effect of operating variables on emission formation.

#### **Section -C**

Control Techniques for SI and CI: Design changes, optimization of operating factors, exhaust gas re-circulation, fumigation, air injector PCV system-Exhaust treatment in SI engines-Thermal reactors-Catalytic converters, Catalysts, Use of unleaded petrol.

#### **Section -D**

Test Procedure & Instrumentation for Emission Measurement and Emission Standards: Test procedures-NDIR analyzer, Flame ionization detectors, Chemiluminescent analyzer, Gas chromatograph, Smoke meters, Emission standards.

#### **REFERENCE BOOKS :**

- 1 Springer and Patterson, Engine Emission, Plenum Press, 1990
- 2 Ganesan. V., Internal Combustion Engines, Tata McGraw Hill Co., 1994.
- 3 SAE Transactions, Vehicle emission, 1982 (3 volumns).
- 4 Obert. E.F., Internal Combustion Engines, 1982.
- 5 Taylor. C.F., Internal Combustion Engines, MIT Press, 1972.
- 6 Heywood. J.B., Internal Combustion Engine Fundamentals, McGraw Hill Book Co., 1995.
- 7 Automobiles and Pollution SAE Transaction, 1995

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3 1 0

Class work Marks: 50  
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#### **Section -A**

Quality Concepts: Quality-Factors influencing quality, quality costs, economics of quality, quality assurance statistical tools used in quality in SQC, Quality planning, Organization for quality. Bureau of Indian standards, ISO 9000-quality circles KAIZEN-TQM concepts-Quality audit.

#### **Section -B**

Statistical Process Control: Variation in processes, Factors, Process capability, Analysis of process capability, control charts, variables, Attributes, Establishing and interpreting control charts, X,R, chart for variables, defects, P chart, C-chart and U chart-Con-troll charts for defective quality rating Acceptance Sampling: Lot-by-lot sampling, types probability of acceptance in single double, multiple sampling techniques-O.C. curves-procedure's Risk and consumers Risk AQL, LTPD, AOQL concepts-standard sampling plans for AQL AND LTPD-uses of standard sampling plans.

#### **Section -C**

Life Testing-Reliability-Systems Approach: Life testing-objectives-classification-failure characteristics-failure data analysis-mean time to failure-maintainability and availability-reliability-system reliability-series and parallel systems-systems reliability in terms of probability of failure-MTBF-Acceptance sampling based on reliability test OC curves.

#### **Section -D**

Quality and Reliability: Reliability improvement-techniques, use of parato analysis - Design for reliability, Redundancy, standby redundancy, failsafe systems-optimization in reliability, product design, product analysis, product development product cycle.

#### **REFERENCE BOOKS :**

1. Betster field D.H. Quality Control-Prentice Hall Pub (1993) (Revised Edn.)
2. Sharma S.C. Inspection Quality Control and Reliability –Khanna Publishers New Delhi (1998)
3. John Bank, The Essence of Total Quality Management, Prentice Hall of India P Ltd New Delhi 1995.
4. Danny Samson, Manufacturing & Operations strategy. Prentice Hall New York (1991)



5. Ganapathy K. Subramaniam B. Narayana V-Quality Circle concepts and implementation – QCFI. Secandrabad 919940.
6. Tapan P. Bagchi ISO9000. Concepts methods and implementation – Wheeler Publisher Allahbad (1994)
7. Conner P.D.T.O. Practical Reliability Engineering John Wiley (1993)
8. Green A.E. and Bourne A.J. Reliability, Technology, Wiley Interscience 1991.

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3 1 0

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Management Training and Operations: Basic principles of supervising. Organising time and people. Job instruction training, training devices and techniques. Driver and mechanic hiring. Driver checklist, Lists for driver and mechanic. Trip leasing. Vehicle operation and types of operation. Automobile Industry: History and development of the automobile industry, market trends, current scenario in Indian auto industry, Auto ancillary industries, Role of the automobile industry in national growth.

**Section -B**

Vehicle Maintenance: Scheduled and unscheduled maintenance Planning and scope. Evaluation of PMI program, Work scheduling, Overtime, Breakdown analysis, Control of repair backlogs, Cost of options. Scheduling and Fare Structure: Route planning, Scheduling of transport vehicles, Preparation of timetable, Costs, fare structure, methods of the fare collection, Preparation of fare table.

**Section -C**

Vehicle Parts, Supply Management and Budget: Cost of inventory, Balancing inventory cost against downtime, Parts control, Bin tag systems. Time management, Time record keeping, Budget activity, Capital expenditures, Classification of vehicle expenses. Fleet management and data processing, Data processing systems- Software. Models – Computer controlling of fleet activity. Energy management.

**Section -D**

Motor Vehicle Act: Schedules and sections, Registration of motor vehicles, Licensing of drivers, Control of permit, Limits of speed, traffic signs. Constructional regulations. Description of goods carrier, delivery van, tanker, tipper, Municipal, fire fighting and break down service vehicle.

**REFERENCE BOOKS :**

1. John Dolu, Fleet Management, McGraw Hill Co., 1984
2. Government Publication, The Motor Vehicle Act, 1989
3. Kitchin. L. D., Bus Operation, Illiffe and Sons Ltd., London, III Edition, 1992
4. Kadiyali. L.R., Traffic Engineering and Transport Planning.

**AUE -312-F      AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY**

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- - 2

Class work Marks: 25

Exam Marks: 25

Total Marks: 50

Exam duration: 3 hrs

**List of Experiments :**

1. To study of rectifier and filters
2. Testing of starting motors and generators
3. To Study of SCR and IC timer, D/A and A/D.
4. Diagnosis of ignition system faults
5. Study of Automobile electrical wiring.
6. Study of rectifiers and filters
7. Study of logic gates, adder and flip-flops
8. Study of SCR and IC timer
9. Interfacing A/D converter and simple data acquisition
10. Micro controller programming and interfacing

**Note:**

**1. At least eight experiments should be performed from the above list.**

**Remaining two experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the Syllabus.**

## **AUE-314-F ENGINE TESTING AND POLLUTION MEASUREMENT LABORATORY**

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Class work Marks: 25

Exam Marks: 25

Total Marks: 50

Exam duration: 3 hrs

### **List of Experiments :**

1. To Study of Pressure pickups, charge amplifier, storage oscilloscope and signal analysers used for IC engine testing.
2. Performance study of petrol and diesel engines both at full load and part load conditions.
3. Morse test on petrol and diesel engines.
4. Determination of compression ratio, volumetric efficiency and optimum cooling water flow rate in engines.
5. Heat balance test on an automotive engine.
6. Testing of 2 and 4 wheelers using chassis dynamometers.
7. Study of NDIR Gas Analyser and FID
8. Study of Chemiluminescent NO<sub>x</sub> analyzer
9. Measurement of HC, CO, CO<sub>2</sub>, O<sub>2</sub> using exhaust gas analyzer
10. Diesel smoke measurement.

### **References:**

1. Giles. J.G., Vehicle Operation and performance, Illiffe Books Ltd., London, 1989.
2. Crouse. W.H. and Anglin. D.L., Motor Vehicle Inspection, McGraw Hill Book Co., 1978.
3. Ganesan. V., Internal Combustion engines, Tata McGraw Hill Co., 1994.
4. BIS code Books, IS-10000 series, 1988.

### **Note:**

**1. At least eight experiments should be performed from the above list.**

**Remaining two Experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the Syllabus.**

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- - 2

Class work Marks: 25

Exam Marks: 25

Total Marks: 50

Exam duration: 3 hrs

**List of Experiments:**

1. Study and layout of an automobile repair, service and maintenance shop.
2. Study and preparation of different statements/records required for the repair and maintenance works
3. Study and preparation of the list of different types of tools and instruments required.
4. Minor and major tune up of gasoline and diesel engines
5. Fault diagnosis in electrical ignition system gasoline fuel system, diesel fuel system and rectification
6. To study the faults in the electrical systems such as Head lights, Side of Parking lights, Trafficator lights, Electric horn system, Windscreen wiper system, Starter system and charging system
7. To study the fuel filters (both gasoline and diesel engines) and air cleaners (dry and wet).
8. To study simple tinkering & soldering works of body panels.
9. To study the door lock and window glass rising mechanisms.
10. Practice of the following:

Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel  
play  
Air bleeding from hydraulic brakes, air bleeding of diesel fuel system

**Note:**

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

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK (HARYANA)**

**SCHEME OF STUDIES & EXAMINATION FOR  
B. TECH. (AUTOMOBILE ENGINEERING)  
SEMESTER-VII**

**'F' Scheme effective from 2016-17**

Course No.	Course Title	Teaching Schedule				Marks For Class Work	Marks for Examination		Total Marks	Duration of Exam
		L	T	P	TOTAL		Theory	Practical		
AUE- 403-F	Vehicle Dynamics	3	1	-	4	50	100	-	150	3
ME-401 F	Automobile Engg.	3	1	-	4	50	100	-	150	3
AUE-411 F	Computer Aided Design	3	1	-	4	50	100	-	150	3
AUE- 405-F	Operations Research and Industrial Management	3	1	-	4	50	100	-	150	3
HU- 407-F	Ethics in Engineering Profession	3	1	-	4	50	100	-	150	3
	Elective	3	1	-	4	50	100		150	3
AUE-406 F	CAD Lab.	-	-	3	3	50	-	50	100	3
ME-409 F	Automobile Engg. Lab	-	-	2	2	50	-	50	100	3
ME-415 F	Practical Training - II	-	-	2	2	-	-	-	-	-
GFME -402-F	General Fitness for the Profession	-	-	-	-	-	-	50	50	3
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>7</b>	<b>31</b>	<b>400</b>	<b>600</b>	<b>150</b>	<b>1150</b>	

**Note:**

- 1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
- 2. A team consisting of Principal/Director, HOD of concerned department and external examiner appointed by University shall carry out the evaluation of the student for his/her General Fitness for the Profession.**

## List of Electives

<b>Sr. No.</b>	<b>Subject Code</b>	<b>Subject Name</b>
1	AUE -410 -F	TRACTORS AND FARM EQUIPMENT
2	AUE- 412-F	OFF-ROAD VEHICLES
3	AUE- 414 -F	TOTAL LIFE CYCLE MANAGEMENT
4	AUE- 418 -F	NON-DESTRUCTIVE TESTING METHODS
5	ME- 420 -F	INDUSTRIAL ENGINEERING
6	ME- 422 -F	FINITE ELEMENT METHODS AND ITS APPLICATION
7	AUE -424 -F	ALTERNATE FUELS AND ENERGY SYSTEMS
8	ME- 428 -F	MANAGEMENT INFORMATION SYSTEMS
9	ME- 430 -F	TOTAL QUALITY MANAGEMENT

**AUE- 403-F**

**VEHICLE DYNAMICS**

L T P

3 1 0

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

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**Section -A**

Introduction: Fundamentals of vibration, Mechanical vibrating systems. Modeling & simulation. Model of an automobile-Single, two, multi degrees of freedom systems-Free, forced and damped vibration. Magnification factor-Transmissibility, Vibration absorber.

**Section -B**

Multi Degree Of Freedom Systems: Closed coupled system, Eigen value problems, Far coupled systems-Orthogonality of mode shapes-Modal analysis, Forced vibration by matrix inversion.

**Section -C**

Suspension and Tyres: Requirements. Spring mass frequency. Wheel hop, wheel wobble, wheel shimmy. Choice of suspension spring rate. Calculation of effective spring rate. Vehicle suspension in fore and aft directions. Ride characteristics of tyres, behaviour while cornering, power consumed by tyre, effect of driving and braking torque-Gough's tyre characteristics.

**Section -D**

Vehicle Handling: Oversteer, under steer, steady state concerning. Effect of braking, driving torques on steering. Effect of camber, transient effects in concerning. Directional Stability of vehicles. Stability of Vehicles: Load distribution. Calculation of tractive effort and reactions for different drives-Stability of a vehicle on a slope, on a curve and a banked road. Numerical Methods: Approximate methods for fundamental frequency, Dunker-Ley's lower bound, Rayleigh's upper bound-Holzer method or close-coupled systems and branched systems.

**REFERENCE BOOKS :**

1 Gillespie. T.D., Fundamentals of vehicle dynamics society of Automotive Engineers, Ic USA 1992

2 Heldt. P.M. Automotive Chassis, Chilton co., New York, 1992

3 Ellis.J.R., Vehicle Dynamics, Business Books Ltd., London, 1991.

4 Giles. J.G. Steering, Suspension and Tyres, Illiffee Books Ltd, London, 1988. 5

Giri. N.K. Automobile Mechanics, Khanna Publishers. New Delhi, 1986.

6 Rao. J.S. & Gupta. K., Theory and Practice of Mechanical Vibrations, Wiley Eastern Ltd., New Delhi, 1999.



**ME- 401- F**

L T P

3 1 0

## **AUTOMOBILE ENGINEERING**

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

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### **Section -A**

Introduction to Automobiles : Classification, Components, Requirements of Automobile Body; Vehicle Frame, Separate Body & Frame, Unitised Body, Car Body Styles, Bus Body & Commercial Vehicle Body Types; Front Engine Rear Drive & Front Engine Front Drive Vehicles, Four Wheel Drive Vehicles, Safety considerations; Safety features of latest vehicle; Future trends in automobiles.

Clutches : Requirement of Clutches – Principle of Friction Clutch – Wet Type & Dry Types; Cone Clutch, Single Plate Clutch, Diaphragm Spring Clutch, Multi plate Clutch, Centrifugal Clutches, Electromagnetic Clutch, Over Running Clutch; Clutch Linkages.

### **Section -B**

Power Transmission : Requirements of transmission system; General Arrangement of Power Transmission system; Object of the Gear Box; Different types of Gear Boxes; Sliding Mesh, Constant Mesh, Synchro- mesh Gear Boxes; Epi-cyclic Gear Box, Freewheel Unit. Overdrive unit-Principle of Overdrive, Advantage of Overdrive, Transaxle, Transfer cases.

Drive Lines, Universal Joint, Differential and Drive Axles: Effect of driving thrust and torque reactions; Hotchkiss Drive, Torque Tube Drive and radius Rods; Propeller Shaft, Universal Joints, Slip Joint; Constant Velocity Universal Joints; Front Wheel Drive; Principle, Function, Construction & Operation of Differential; Rear Axles, Types of load coming on Rear Axles, Full Floating, Three quarter Floating and Semi Floating Rear Axles

### **Section -C**

Suspension Systems : Need of Suspension System, Types of Suspension; factors influencing ride comfort, Suspension Spring; Constructional details and characteristics of leaf springs. Steering System : Front Wheel geometry & Wheel alignment viz. Caster, Camber, King pin Inclination, Toe-in/Toe-out; Conditions for true rolling motions of Wheels during steering; Different types of Steering Gear Boxes; Steering linkages and layout; Power steering – Rack & Pinion Power Steering Gear, Electronics steering.

### **Section -D**

Automotive Brakes, Tyres & Wheels : Classification of Brakes; Principle and constructional details of Drum Brakes, Disc Brakes; Brake actuating systems; mechanical, Hydraulic, Pneumatic

Brakes; Factors affecting Brake performance, Power Power Assisted Brakes; Tyres of Wheels; Types of Tyre & their constructional details, heel Balancing, Tyre Rotation; Types of Tyre wear & their causes. Emission Control System & Automotive Electrical : Sources of Atmospheric Pollution from the automobile, Emission Control Systems – Construction and Operation of Positive Crank Case Ventilation ( PVC) Systems, Evaporative Emission Control, Heated Air Intake System, Exhaust Gas Recirculation ( ECR ) Systems, Air Injection System and Catalytic Converters; Purpose construction & operation of lead acid Battery, Capacity Rating & Maintenance of Batteries; Purpose and Operation of Charging Systems, Purpose and Operations of the Starting System; Vehicle Lighting System.

**Text Books:**

1. Automobile Engineering by Anil Chhikara, Satya Prakashan, New Delhi.
2. Automobile Engineering by Dr. Kirpal Singh, standard Publishers Distributors.

**Reference Books:**

1. Automotive Mechanics – Crouse / Anglin, TMH.
2. Automotive Technology – H.M. Sethi, TMH, New Delhi.
3. Automotive Mechanics – S.Srinivasan, TMH, New Delhi.
4. Automotive Mechanics – Joseph Heitner, EWP.
5. Motor Automotive Technology by Anthony E. Schwaller – Delmer Publishers, Inc.
6. The Motor Vehicle – Newton Steeds Garrett, Butter Worths.

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### Section -A

**Introduction:** Introduction to CAD/CAM, Historical developments, Industrial look at CAD/CAM, Introduction to CIM; Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems.

**Transformations:** Introduction, transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections, reconstruction of 3-D objects.

### Section -B

**Curves:** Algebraic and geometric forms, tangents and normal, blending functions reparametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves.

**Surfaces:** Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, sixteen point form, four curve form, plane surface, ruled surface, surface of revolution, tabulated cylinder, bi-cubic surface, bezier surface, B-spline surface.

### Section -C

**Solids:** Solid models and representation scheme, boundary representation, constructive solid geometry, sweep representation, cell decomposition, spatial occupancy enumeration. **Automation and Numerical Control:** Introduction, fixed, programmable and flexible automation, types of NC systems, MCU and other components, NC manual part programming, coordinate systems, G & M codes, Part program for simple parts, computer assisted part programming.

### Section -D

**Group Technology:** Part families, part classification and coding, production flow analysis, Machine cell design, Advantages of GT

**Flexible Manufacturing Systems & Computer aided process planning:**

Introduction, FMS components, types of FMS, FMS layouts, planning for FMS, advantages and applications Conventional process planning, types of CAPP, Steps invariant process planning, planning for CAPP.

**TEXT BOOKS:**

1. CAD/ CAM by Groover and Zimmer, Prantice Hall.
2. CAD/ CAM Theory and Practice by Zeid, McGraw Hill
3. Numerical Control and Computer Aided Manufacturing by Kundra, Rao & Tiwari, TMH.

**REFERENCE BOOKS :**

- 1 CAD/CAM ( Principles, Practice & Manufacturing Management ) by Chirs Mc Mohan & Jimmie Browne, Published by Addison- Wesley.

L T P

3 1 0

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Operations Research: Introduction to OR, definition, linear programming; graphical method, simplex method, dual problem, dual simplex method, transportation and assignment problems,

**Section -B**

Industrial Management: Principles and functions of Management: Leadership and decision making. Project Management: CPM and PERT, Queuing theory, Game theory, Markov chain, Monte Carlo Simulation.

**Section -C**

Human resources: personnel management, industrial legislation and relations, industrial psychology, manpower planning, training and development, health, safety, welfare, remuneration and incentive schemes.

**Section -D**

Materials, Purchase and Stores Management: Inventory control. Sales and Marketing Management. Cost Accounting and Control, Budget and Budgetary control.

**REFERENCE BOOKS :**

1. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
2. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan.
3. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India.
4. Operations Research by J.K.Sharma, Macmillan.

**HU- 407 -F**

**ETHICS IN ENGINEERING PROFESSION**

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Science, Technology and Engineering as knowledge and as social and professional activities. Inter-relationship of technology growth and social, economic and cultural growth; historical perspective. Ancient, medieval and modern technology/industrial revolution and its impact; the Indian Science and Technology.

**Section -B**

Social and human critiques of technology; Mumford and Ellul. Rapid technological growth and depletion of resources; reports of the club of Rome; limits to growth; sustainable development. Energy crisis, renewable energy resources. Environmental degradation and pollution; eco-friendly technologies; environmental regulations; environmental ethics. Technology and the arms race; the nuclear threat. Appropriate technology movement of Schumacher; later developments.

**Section -C**

Technology and the developing nations; problems of technology transfer; technology assessment/impact analysis. Human operator in engineering projects and industries; problems of man-machine interaction; impact of assembly line and automation; human centred technology. Industrial hazards and safety; safety regulations, safety engineering.

**Section -D**

Politics and technology; authoritarian versus democratic control of technology; social and ethical audit of industrial organizations. Engineering profession; ethical issues in engineering practice; conflicts between business demands and professional ideals; social and ethical responsibilities of the engineer; codes of professional ethics; whistle blowing and beyond; case studies.

**REFERENCE BOOKS :**

1. Baum, R.J., ed, Ethical Problems in Engineering
2. Beabout, G.R., Wennemann, D.J., Applied Professional Ethics

**AUE- 406 -F**

**COMPUTER AIDED DESIGN LAB**

L T P  
- - 3

Class work Marks: 50  
Exam Marks: 50  
Total Marks: 100  
Exam duration: 3 hrs

**The students will be required to carry out the following exercises using software packages (e.g. 3D modeling package/ Pro Engineer/ I-Deas/ Solid Edge etc.).**

1. Part diagram of screw threads.
2. Part and Assembly of Universal Coupling.
3. Part and Assembly of Bushed Bearing.
4. Part and Assembly of Knuckle Joint.
5. Part and Assembly of Plummer Block.
6. Part and Assembly of Screw Jack.
7. Part and Assembly of Piston.
8. Part and Assembly of Stuffing box.
9. Components and assembly drawing of clutch.
10. Drawing of chassis.

**Note: At least 8 to 10 more exercises to be given by the teacher concerned.**

**ME- 409-F**

**AUTOMOBILE ENGINEERING LAB**

L T P

- - 2

Class work Marks: 50

Exam Marks: 50

Total Marks: 100

Exam duration: 3 hrs

**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 Steering 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.

11. Modeling of any two automotive systems on 3D CAD using educational softwares (eg. 3D modeling package/Pro Engineering/I-Deas/ Solid edge etc.)

12. Crash worthiness of the designed frame using Hypermesh and LS-Dyna solver or other software.

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

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

**ME – 415 - F      PRACTICAL TRAINING – II**

**L T P**

- - 2

At the end of Sixth semester each student would undergo six weeks Practical Training in an industry/ Professional organization / Research Laboratory with the prior approval of the Director- Principal/ Principal of the concerned college and submit a written typed report along with a certificate from the organization. The report will be a evaluated during VII Semester by a Board of Examiners to be appointed by the Director- Principal/ Principal of the concerned college who will award one of the following grades:

**Excellent: A**

**Good: B**

**Satisfactory: C**

**Not satisfactory: F**

A student who has been awarded 'F' grade will be required to repeat the practical training.

## Elective Papers

**AUE -410 -F**

**TRACTORS AND FARM EQUIPMENT**

L T P

3 1 0

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### **Section -A**

General Design of Tractors : Classification of Tractors-Main components of Tractor-Safety Rules. Farm Equipments: Working attachment of tractors-Farm equipment – Classification – Auxiliary equipment – Trailers and body tipping mechanism.

### **Section -B**

Control of the Tractor and Fundamentals of Engine Operation: Tractor controls and the starting of the tractor engines-Basic notions and definition-Engine cycles-Operation of multicylinder engines-General engine design - Basic engine performance characteristics.

### **Section -C**

Engine Frame Work and Valve Mechanism of Tractor: Cylinder and pistons-Connecting rods and crankshafts Engine balancing – Construction and operation of the valve mechanism-Valve mechanism components – Valve mechanism troubles.

### **Section -D**

Cooling system, Lubrication System and Fuel System of a Tractor: Cooling system – Classification – Liquid cooling system – Components, Lubricating system servicing and troubles – Air cleaner and turbo charger – Fuel tanks and filters –Fuel pumps.

### **REFERENCE BOOKS :**

1. Rodichev and G.Rodicheva, Tractor and Automobiles, MIR Publishers, 1987
2. Kolchin. A., and V.Demidov Design of Automotive engines for tractor, MIR Publishers, 1972

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Classification and Requirements of Off Road Vehicles: Power plants, chassis and transmission, Multi-axle vehicles.

**Section -B**

Land clearing machines: Bush cutter, stumpers, Tree dozer, Rippers.

**Section -C**

Earth Moving Machines: Bulldozers, cable and hydraulic dozer. Crawler track, running and steering gears, scrapers, drag and self powered types – Dump track and dumpers – Loaders, single bucket, multi bucket and rotary types- Power and capacity of earth moving machines.

**Section -D**

Scrapers and Graders: Scrapers, elevating graders, self powered scrapers and graders. Shovels and Ditchers : Power shovel, revolving and stripper shovels – drag lines – ditchers – Capacity of shovels.

**REFERENCE BOOKS :**

1. Abrosimov.K. Bran berg. A. and Katayer. K., Road making Machinery, MIR Publishers, Moscow, 1971.
2. Wang. J.T., Theory of Grand vehicles, John Wiley & Sons, New York, 1987
3. Off the road Wheeled and combined traction devices – Ashgate Publishing Co. Ltd. 1988.

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

#### **Section -A**

Definition of total life cycle (TLC)-Concept of TLC-Life cycle impacts-Integrating life cycle technologies-Products and processes within TLC-TLC methodology-TLC assessment data to complex products-Results Improvement for product.

#### **Section -B**

Vehicle End Life: Design for end of old vehicle management –Problems of old vehicles in emerging markets-recovery and economic feasibility of materials such as Plastics, rubber aluminum, steel,etc.

#### **Section -C**

Tradeoffs: Applying life cycle thinking to define tradeoffs along the supply, manufacture-use and end of life chain-Effect on the customer- Expectation of the customer-Evaluate product cost on fuel consumption, emissions, durability, environment and health.

#### **Section -D**

Sustainability: What is sustainability-Use of renewable resources-View to design horizon. Harmonization of Environmental Goals: TLC for emerging vs. developed markets-Rules and regulations to guide designers-International common practices for end of life vehicles.

#### **REFERENCE BOOKS :**

1.Collaborative Product and Service **Life Cycle Management** by Richard Curran, Shuo-Yan Chou, Amy Trappey

**AUE- 418-F**

**NON-DESTRUCTIVE TESTING METHODS**

L T P  
3 1 0

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Non-Destructive Testing: Introduction, classification of NDT techniques, Visual examination: Bore-scopes, video devices.

**Section -B**

Magnetic particle testing: Operating principal, magnetising technique. Liquid Penetrating technique: Principle, process description.

**Section -C**

Ultrasonic Testing: Definition, advantages and applications, inspection methods. Radiography: Electromagnetic radiation sources, process description.

**Section -D**

Thermography: Infrared theory, contact, non-contact methods. Accoustic emission testing, eddy current testing, Leak testing: Bubble emission testing, Air leak testing. Case studies on defects in casting, rolling, welding, and heat-treating.

**REFERENCE BOOKS :**

1. Non-Destructive Testing by Warren J.Mcgomnagle, McGrawhill.
2. Non-Destructive Testing by Baldev Raj et. al., Narosa Publishing House.

**ME- 420-F**  
L T P  
3 1 0

## **INDUSTRIAL ENGINEERING**

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### **Section -A**

Production Planning and Control; Product: product design, customer requirements, value engineering, quality, reliability, service life, and competitiveness.

### **Section -B**

Plant: location, layout, material handling, equipment selection, maintenance of equipment and facilities.

### **Section -C**

Processes: Job, batch and flow production methods, Group Technology Work study and Time and Motion study, Work/job evaluation, quality control (SPC), control charts.

### **Section -D**

Resource planning: production/ operation control, forecasting, capacity management, scheduling and loading, line balancing, breakeven analysis, inventory of materials and their control, manufacturing planning, MRP - II, JIT.

### **REFERENCE BOOKS :**

1. Production, Planning and Inventory Control by S.L.Narasimhan, D.W.McLeavey, P.J.Billington, Prentice Hall.
2. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
3. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan.



**ME- 422-F**  
L T P  
3 1 0

## **FINITE ELEMENT METHODS AND ITS APPLICATION**

Class work Marks: 50  
Theory Marks: 100  
Total Marks: 150  
Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### **Section -A**

Introduction : Review of various approximate methods in structural analysis. Stiffness and flexibility matrices for simple cases. Basic concepts of finite element method. Formulation of governing equations and convergence criteria.

### **Section -B**

Discrete Elements: Use of bar and beam elements in structural analysis. Computer implementation of procedure for these elements. Continuum Elements: Different forms of 2D elements and their applications for plane stress, plane strain and axi-symmetric problems. Consistent and lumped formulation. Use of local coordinates. Numerical integration.

### **Section -C**

ISO Parametric Elements: Definition and use of different forms of 2D and 3D elements. Computer implementation of formulation of these elements for the analysis of typical structural parts.

### **Section -D**

Solution Schemes: Different methods of solution of simultaneous equations governing static, dynamic and stability problems. General purpose software packages.

### **REFERENCE BOOKS :**

1. Segerlind. L.J., Applied Finite Element Analysis, Secon Edition, John Wiley and Sons Inc., New York, 1984.
2. Bathe.K.J. and Wilson. E.L., Numerical methods in finite element analysis, Prentice Hall of India Ltd., 1983.
3. Cook. R.D., Concepts and Applications of Finite Element analysis, 3rd Edition, John Wiley & Sons, 1989.
4. Krishnamurthy. C.S., Finite Element Analysis, Tata McGraw Hill., 1987
5. Ramamurthi.V., Computer Aided Design in Mechanical Engineering, Tata McGraw Hill, 1987.

**AUE -424 -F**

**ALTERNATE FUELS AND ENERGY SYSTEMS**

L T P

3 1 0

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section -A**

Introduction: Estimation of petroleum reserve-Need for alternate fuel-Availability and properties of alternate fuels-general use of alcohols- LPG-Hydrogen-Ammonia, CNG, and LNG-Vegetable oils and Biogas-Merits and demerits of various alternate fuels.

**Section -B**

Alcohols: Properties as engine fuels, alcohols and gasoline blends-Combustion characteristics in engines-emission characteristics. Vegetable Oils: Various vegetable oils for engines-Esterification-Performance in engines-Performance and emission characteristics

**Section -C**

Natural Gas, LPG, Hydrogen and Biogas: Availability of CNG, properties modification required to use in engines-performance and emission characteristics of CNG using LPG in SI & CI engines. Performance and emission for LPG-Hydrogen-Storage and handling, performance and safety aspects.

**Section -D**

Electrical and Solar Powered Vehicles: Layout of an electric vehicle-Advantage and limitations-Specifications-System component, Electronic control system-High energy and power density batteries-Hybrid vehicle-Solar powered vehicles.

**REFERENCE BOOKS :**

1. Maheswar Dayal, Energy today & tomorrow, I & B Horishr India,1982
2. Nagpal, Power Plant Engineering, Khanna Publishers,1991.
3. Alcohols and Motor fuels progress in technology, Series No.19,SAEPublication USA 1980.
4. SAE paper Nos.840367, 841156,841333,841334.
5. The properties and performance of modern alternate fuels SAE paper No 841210.
6. Bechtold.R.L. Alternative Fuels Guide Book, SAE, 1997.

**ME- 428 -F**

L T P

3 1 0

## **MANAGEMENT INFORMATION SYSTEMS**

Class work Marks: 50

Theory Marks: 100

Total Marks: 150

Exam duration: 3 hrs

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

### **Section -A**

Introduction to Management Information Systems (MIS); Data, information and knowledge concepts, concepts of information representation: storage, dissemination, discrimination and transmission.

### **Section -B**

Data base management systems, design and implementation of RDBMS for managerial applications, retrieval aspects, and security and privacy aspects.

### **Section -C**

Specification and configuration of computer based systems; Manufacturing Management Information systems- its subsystems and outputs; costing and performance audit applications in MIS.

### **Section -D**

Types of information system used in management Information Systems. Communication devices, media, systems; network hardware and software; network configuration; network applications; coding of data. cost/benefit analysis; distributed versus centralised systems; architectures, topologies and protocols; installation and operation of bridges, routers and gateways; network performance analysis; privacy, security, reliability; installation and configuration of LAN and WAN networks.

### **REFERENCE BOOKS :**

1. Management Information Systems, Organisation and Technology by Loudon and Loudon, 4th ed., Prentice Hall.

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

#### **Section -A**

Basic concepts, definitions and history of quality control. Quality function and concept of quality cycle. Quality policy and objectives. Economics of quality and measurement of the cost of quality. Quality considerations in design.

#### **Section -B**

Process control: Machine and process capability analysis. Use of control charts and process engineering techniques for implementing the quality plan.

#### **Section -C**

Acceptance Sampling: single, double and multiple sampling, lot quality protection, features and types of acceptance sampling tables, acceptance sampling of variables and statistical tolerance analysis. Quality education, principles of participation and participative approaches to quality commitment.

#### **Section -D**

Emerging concepts of quality management: Taguchi's concept of off-line quality control and Ishikawa's cause and effect diagram.

#### **REFERENCE BOOKS :**

1. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
2. Quality Control and Applications by Housen & Ghose
3. Industrial Engineering Management by O.P. Khanna

At the end of semester students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the principal/Director of the College. A specimen Performa indicating the weightage to each component/ activity is given below:-

Name : \_\_\_\_\_ College Roll No. \_\_\_\_\_

Univ.Roll No. \_\_\_\_\_

Branch \_\_\_\_\_ Year of Admission \_\_\_\_\_

**I. Academic Performance (15 Marks) :**

(a) Performance in University Examination:-

Sem.	Result	%age of Marks obtained	Number of Attempt in which the Sem. exam. has been cleared
I			
II			
III			
IV			
V			
VI			
VII			

**II. Extra Curricular Activities (10 Marks) :**

Item	Level of Participation	Remarks (Position Obtained)
Indoor Games (Specify the _____)	_____	_____
Games	_____	
Outdoor Games (Specify the _____ Games)	_____ _____	

Essay \_\_\_\_\_

Competition \_\_\_\_\_  
\_\_\_\_\_

Scientific \_\_\_\_\_  
Technical \_\_\_\_\_  
Exhibitions \_\_\_\_\_

Debate \_\_\_\_\_  
\_\_\_\_\_

Drama \_\_\_\_\_  
\_\_\_\_\_

Dance \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Music \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Fine Arts \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Painting \_\_\_\_\_  
\_\_\_\_\_

Hobby Club \_\_\_\_\_  
\_\_\_\_\_

N.S.S. \_\_\_\_\_  
\_\_\_\_\_

H ostel Mgt \_\_\_\_\_  
\_\_\_\_\_

Activities \_\_\_\_\_  
\_\_\_\_\_

Any other activity \_\_\_\_\_  
(Please Specify) \_\_\_\_\_  
\_\_\_\_\_

**III. Educational tours/visits/Membership of Professional Societies (5 Marks)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**IV. Contribution in NSS Social Welfare Floor Relief/draught relief/Adult Literacy mission/Literacy**

**Mission/Blood Donation/Any other Social Service**

**(5 Marks)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**V. Briefly evaluate your academic & other performance & achievements in the Institution (5 Marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**VI. Performance in Viva voce before the committee (10 Marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*Marks obtained I ( )+II( )+III( )+IV( )+V( )+VI( ) =

\*\*Total Marks:

Member

Member

Member

Member

Member

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK (HARYANA)**  
**SCHEME OF STUDIES & EXAMINATION FOR**  
**B. TECH. (AUTOMOBILE ENGINEERING)**  
**SEMESTER-VIII**  
**'F' Scheme effective from 2016-17**

Course No.	Subject	Internal Marks	External Marks	Total
ME-413-F	Industrial Training / Institutional Project Work	150	150	300

**Note:**

The students are required to undergo Industrial Training or Institutional Project Work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the mid-term progress report at the Institute. The presentation will be attended by a committee. Alternately, the teacher may visit the Industry to get the feedback of the students.

The final viva-voce of the Industrial Training or Institutional Project Work will be conducted by an external examiner and one internal examiner appointed by the Institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the Board of Studies in Engg. & Technology. Assessment of Industrial Training or Institutional Project Work will be based on seminar, viva-voce, report and certificate of Industrial Training or Institutional Project Work obtained by the student from the industry or Institute.

**The internal marks distributions for the students who have undergone Industrial Training consist of 50 marks from the industry concern and 100 marks by the committee members consisting of faculty members of concerned department of the parent institute.**

The teachers engaged for Institutional Project work shall have a workload of 2 hours per group (at least 4 students) per week.