

Course code	Course Name	L-T-P - Credits	Year of Introduction
HS300	Principles of Management	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To develop ability to critically analyse and evaluate a variety of management practices in the contemporary context; To understand and apply a variety of management and organisational theories in practice; To be able to mirror existing practices or to generate their own innovative management competencies, required for today's complex and global workplace; To be able to critically reflect on ethical theories and social responsibility ideologies to create sustainable organisations. 			
Syllabus Definition, roles and functions of a manager, management and its science and art perspectives, management challenges and the concepts like, competitive advantage, entrepreneurship and innovation. Early contributors and their contributions to the field of management. Corporate Social Responsibility. Planning, Organizing, Staffing and HRD functions, Leading and Controlling. Decision making under certainty, uncertainty and risk, creative process and innovation involved in decision making.			
Expected outcome. A student who has undergone this course would be able to <ol style="list-style-type: none"> manage people and organisations critically analyse and evaluate management theories and practices plan and make decisions for organisations do staffing and related HRD functions 			
Text Book: Harold Koontz and Heinz Weihrich, <i>Essentials of Management</i> , McGraw Hill Companies, 10th Edition.			
References: <ol style="list-style-type: none"> Daft, <i>New era Management</i>, 11th Edition, Cengage Learning Griffin, <i>Management Principles and Applications</i>, 10th Edition, Cengage Learning Heinz Weirich, Mark V Cannice and Harold Koontz, <i>Management: a Global, Innovative and Entrepreneurial Perspective</i>, McGraw Hill Education, 14th Edition Peter F Drucker, <i>The Practice of Management</i>, McGraw Hill, New York Robbins and Coulter, <i>Management</i>, 13th Edition, 2016, Pearson Education 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Introduction to Management: definitions, managerial roles and functions; Science or Art perspectives- External environment-global, innovative and entrepreneurial perspectives of Management (3 Hrs.)– Managing people and organizations in the context of New Era- Managing for competitive advantage - the Challenges of Management (3 Hrs.)	6	15%

II	Early Contributions and Ethics in Management: Scientific Management- contributions of Taylor, Gilbreths, Human Relations approach-contributions of Mayo, McGregor's Theory, Ouchi's Theory Z (3 Hrs.) Systems Approach, the Contingency Approach, the Mckinsey 7-S Framework Corporate Social responsibility- Managerial Ethics. (3 Hrs)	6	15%
FIRST INTERNAL EXAMINATION			
III	Planning: Nature and importance of planning, -types of plans (3 Hrs.)- Steps in planning, Levels of planning - The Planning Process. – MBO (3 Hrs.).	6	15%
IV	Organising for decision making: Nature of organizing, organization levels and span of control in management Organisational design and structure –departmentation, line and staff concepts (3 Hrs.) Limitations of decision making- Evaluation and selecting from alternatives- programmed and non programmed decisions - decision under certainty, uncertainty and risk-creative process and innovation (3 Hrs.)	6	15%
SECOND INTERNAL EXAMINATION			
V	Staffing and related HRD Functions: definition, Empowerment, staff – delegation, decentralization and recentralisation of authority – Effective Organizing and culture-responsive organizations –Global and entrepreneurial organizing (3 Hrs.) Manager inventory chart-matching person with the job-system approach to selection (3 Hrs.) Job design-skills and personal characteristics needed in managers-selection process, techniques and instruments (3 Hrs.)	9	20%
VI	Leading and Controlling: Leading Vs Managing – Trait approach and Contingency approaches to leadership - Dimensions of Leadership (3 Hrs.) - Leadership Behavior and styles – Transactional and Transformational Leadership (3 Hrs.) Basic control process- control as a feedback system – Feed Forward Control – Requirements for effective control – control techniques – Overall controls and preventive controls – Global controlling (3 Hrs.)	9	20%
END SEMESTER EXAM			

Question Paper Pattern

Max. marks: 100, Time: 3 hours .

The question paper shall consist of three parts

Part A: 4 questions uniformly covering modules I and II. Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B : 4 questions uniformly covering modules III and IV. Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C: 6 questions uniformly covering modules V and VI. Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.

Course code	Course Name	L-T-P-Credits	Year of Introduction
ME302	Heat and Mass Transfer	3-1-0-4	2016
Prerequisites : ME203 Mechanics of fluid			
Course Objectives: <ul style="list-style-type: none"> To introduce the various modes of heat transfer and to develop methodologies for solving a wide variety of practical heat transfer problems To provide useful information concerning the performance and design of simple heat transfer systems To introduce mass transfer 			
Syllabus: Modes of Heat Transfer: Conduction: Most general heat conduction equation, One dimensional steady state conduction with and without heat generation, Critical radius of insulation, Elementary ideas of hydrodynamics and thermal boundary layers, Convection heat transfer: Newton's law of cooling, Dimensionless numbers, Dimensional analysis, Problems. Fins: Types of fins : Fin efficiency and effectiveness. Boiling and condensation heat transfer, Introduction to heat pipe. Transient heat conduction. Heat exchangers, LMTD and NTU methods. Radiation: laws of radiation, Electrical analogy, Radiation shields. Mass Transfer :Mass transfer by molecular diffusion, Convective mass transfer.			
Expected outcome: The students will be able to <ol style="list-style-type: none"> Apply principles of heat and mass transfer to engineering problems Analyse and obtain solutions to problems involving various modes of heat transfer Design heat transfer systems such as heat exchangers, fins, radiation shields etc.. 			
Text Books: <ol style="list-style-type: none"> Sachdeva R C, Fundamentals of Engineering Heat and Mass Transfer, New Age Science Limited, 2009 R.K.Rajput. Heat and mass transfer, S.Chand& Co.,2015 Nag P K., Heat and Mass Transfer, McGraw Hill,2011 Kothandaraman, C.P., Fundamentals of Heat and Mass Transfer, New Age International, New Delhi, 2006 			
Data Book: <ul style="list-style-type: none"> Heat and Mass Transfer data book: C.P. Kothandaraman, S. Subramanya, New age International publishers,2014 			
References Books: <ol style="list-style-type: none"> Yunus A Cengel, Heat Transfer: A Practical Approach, McGraw Hill,2015 Holman J P, Heat Transfer, McGraw Hill, 2011 Frank P. Incropera and David P. Dewitt, Heat and Mass Transfer, John Wiley and sons, 2011 			

Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Modes of Heat Transfer: Conduction: Fourier law of heat conduction-Thermal conductivity of solids, liquids and gases-Factors affecting thermal conductivity- Most general heat conduction equation in Cartesian, cylindrical and spherical coordinates One dimensional steady state conduction with and without heat generation conduction through plane walls, cylinders and spheres-variable thermal conductivity conduction shape factor- heat transfer through corners and edges. Critical radius of insulation.	12	15%
II	Elementary ideas of hydrodynamics and thermal boundary layers-Thickness of Boundary layer-Displacement, Momentum and Energy thickness (description only). Convection heat transfer: Newton's law of cooling- Laminar and Turbulent flow, Reynolds Number, Critical Reynolds Number, Prandtl Number, Nusselt Number, Grashoff Number and Rayleigh's Number. Dimensional analysis Buckingham's Pi theorem- Application of dimensional analysis to free and forced convection- empirical relations- problems using empirical relations	10	15%
FIRST INTERNAL EXAMINATION EXAM			
III	Transient heat conduction-lumped heat capacity method. Fins: Types of fins - Heat transfer from fins of uniform cross sectional area- Fin efficiency and effectiveness. Boiling and condensation heat transfer(elementary ideas only),Introduction to heat pipe.	8	15%
IV	Combined conduction and convection heat transfer-Overall heat transfer coefficient - Heat exchangers: Types of heat exchangers, AMTD, Fouling factor, Analysis of Heat exchangers- LMTD method, Correction factor, Effectiveness-NTU method, Special type of heat exchangers (condenser and evaporator, simple problems only)	8	15%
SECOND INTERNAL EXAMINATION			
V	Radiation- Nature of thermal radiation-definitions and concepts- monochromatic and total emissive power-Intensity of radiation- solid angle- absorptivity, reflectivity and transmissivity-Concept of black body- Planck' law- Kirchoff's law- Wein's displacement law-Stefan Boltzmann's law- black, gray and real surfaces-Configuration factor (derivation for simple geometries only)- Electrical analogy- Heat exchange between black/gray surfaces- infinite parallel plates, equal and parallel opposite plates-perpendicular rectangles having common edge- parallel discs (simple problems using charts and tables). Radiation shields(no derivation).	10	20%

VI	Mass Transfer :Mass transfer by molecular diffusion- Fick's law of diffusion- diffusion coefficient Steady state diffusion of gases and liquids through solid- equimolar diffusion, Isothermal evaporation of water through air- simple problems. Convective mass transfer- Evaluation of mass transfer coefficient- empirical relations- simple problems- analogy between heat and mass transfer.	8	20%
END SEMESTER EXAM			

Question Paper Pattern

Use of approved data book permitted

Total marks: 100, Time: 3 hrs

The question paper should consist of three parts

Part A

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

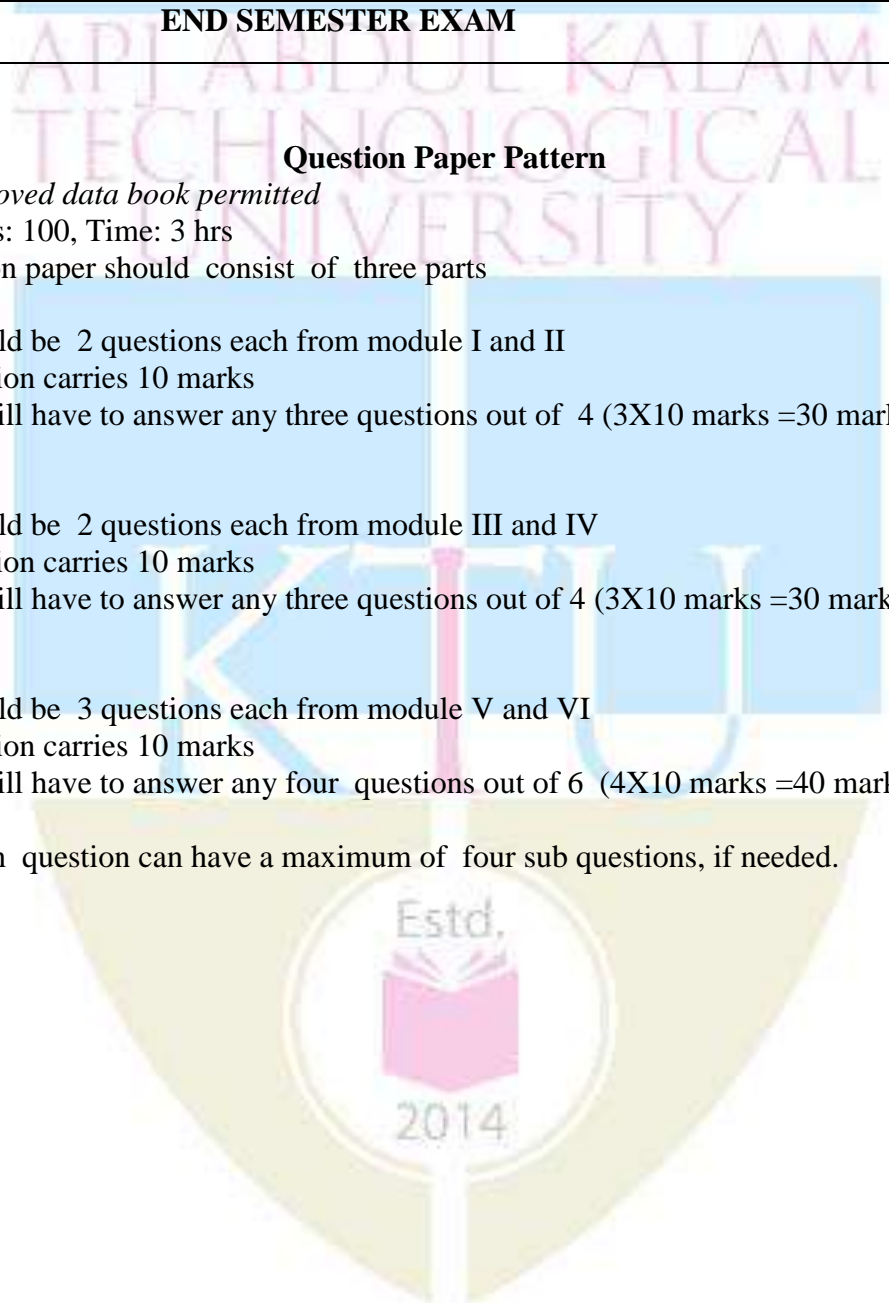
Part C

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.



Course code	Course Name	L-T-P-Credits	Year of Introduction
ME308	COMPUTER AIDED DESIGN AND ANALYSIS	3-0-0-3	2016

Prerequisite: ME201 Mechanics of solids

Course Objectives:

1. To impart basic knowledge on Computer Aided Design methods and procedures
2. To introduce the fundamentals of solid modelling
3. To introduce the concepts of finite element analysis procedures.

Syllabus

Introduction to CAD/CAM, Basics of geometric and solid modeling, transformation, representation points, lines, surfaces and solid models. Introduction to finite element analysis, solution procedures, interpolation, isoparametric formulation, applications.

Expected outcome:

The students will be able to

1. Gain a basic knowledge on Computer Aided Design methods and procedures
2. Understand the fundamentals of solid modelling
3. Have a basic knowledge in finite element analysis procedures.

Text Books:

1. M.P. Groover, E.M. Zimmers, Jr. CAD/CAM; Computer Aided Design and Manufacturing, Prentice Hall of India, 1987
2. T. R. Chandrupatla and A. D. Belagundu, Introduction to Finite Elements in Engineering, Pearson Education, 2001

References:

1. Chris McMahon and Jimmie Browne - CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, 1998
2. D. F. Rogers and J. A. Adams, Mathematical Elements in Computer Graphics, McGraw-Hill, 1990
3. Daryl Logan, A First course in Finite Element Method, Thomson Learning, 2007
4. David V Hutton, Fundamentals of Finite Element Analysis, THM, 2003
5. Donald Hearn, M. Pauline Baker and Warren Carithers, Computer Graphics with open GL, Pearson Education, 2001
6. Grigore Burdea, Philippe Coiffet, Virtual Reality Technology, John Wiley and sons, 2003
7. Ibrahim Zeid, CAD/ CAM Theory and Practice, McGraw Hill, 2007
8. P. Radhakrishnan and S. Subramanyan, CAD / CAM / CIM, New Age Int. Ltd., 2008

Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Introduction to CAD , Historical developments, Industrial look at CAD, Comparison of CAD with traditional designing, Application of computers in Design	2	15%
	Basics of geometric and solid modeling, Packages for CAD/CAM/CAE/CAPP	1	
	Hardware in CAD components, user interaction devices, design database, graphic Standards, data Exchange Formats, virtual Reality.	4	
II	Transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling.	4	15%
	Shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections, reconstruction of 3-D objects.	3	
FIRST INTERNAL EXAM			
III	Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves.	4	15%
	Plane surface, ruled surface, surface of revolution, tabulated cylinder, bi-cubic surface, bezier surface, B-spline surfaces and their modeling techniques.	3	
IV	Solid models and representation scheme, boundary representation, constructive solid geometry.	3	15%
	Sweep representation, cell decomposition, spatial occupancy enumeration, coordinate systems for solid modeling.	4	
SECOND INTERNAL EXAM			
V	Introduction to finite element analysis - steps involved in FEM- Preprocessing phase – discretisation - types of elements	2	20%
	Formulation of stiffness matrix (direct method, 1-D element) - formulation of load vector - assembly of global equations - implementation of boundary conditions - solution procedure - post processing phase	3	
	Simple problems with axial bar element (structural problems only)	2	
VI	Interpolation – selection of interpolation functions - CST element - isoparametric formulation (using minimum PE theorem) – Gauss-quadrature	4	20%

	Solution of 2D plane stress solid mechanics problems (linear static analysis)	3	
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hrs

The question paper should consist of three parts

Part A

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.



Course code	Course Name	L-T-P-Credits	Year of Introduction						
ME332	COMPUTER AIDED DESIGN AND ANALYSIS LAB	0-0-3-1	2016						
Prerequisite: ME308 Computer aided design and analysis									
Course Objectives: <ul style="list-style-type: none"> To provide working knowledge on Computer Aided Design methods and procedures To impart training on solid modelling software To impart training on finite element analysis software 									
Syllabus Introduction to solid modeling and Finite Element Analysis software. Exercises on modeling and assembly. <ol style="list-style-type: none"> Creation of higher end 3D solid models.(minimum 3 models) Creation of assembled views of riveted joints, cotter joints and shaft couplings. (minimum 3 models) Exercises on the application of Finite Element Method/Finite Volume Method to engineering systems:- <ol style="list-style-type: none"> Structural analysis. (minimum 3 problems) Thermal analysis. (minimum 2 problems) Fluid flow analysis. (minimum 1 problem) 									
Expected outcome: The students will be able to <ol style="list-style-type: none"> Gain working knowledge in Computer Aided Design methods and procedures Solve simple structural, heat and fluid flow problems using standard software 									
Points to note: <ul style="list-style-type: none"> Any appropriate solid modeling software (like CATIA, Solids Works, ProE, IDEAS, Siemens Solid Edge and NX, free software, etc.) and package (like ANSYS, Comsol Multi Physics, NASTRAN, ABAQUS, ADINA, Siemens Femap Nastran, free software etc.) may be used. Evaluation <table style="margin-left: 20px;"> <tr> <td>Class exercises</td> <td>60 marks</td> </tr> <tr> <td>Regular class viva</td> <td>10 marks</td> </tr> <tr> <td>Final internal exam using software</td> <td>30 marks</td> </tr> </table> All the above three evaluations are mandatory. 				Class exercises	60 marks	Regular class viva	10 marks	Final internal exam using software	30 marks
Class exercises	60 marks								
Regular class viva	10 marks								
Final internal exam using software	30 marks								
References Books: <ol style="list-style-type: none"> Daryl Logan, A First course in Finite Element Method, Thomson Learning, 2007 David V Hutton, Fundamentals of Finite Element Analysis, Tata McGraw Hill, 2003 Ibrahim Zeid, CAD/ CAM Theory and Practice, McGraw Hill, 2007 Mikell P. Groover and Emory W. Zimmer, CAD/ CAM – Computer aided design and manufacturing, Pearson Education, 1987 T. R. Chandrupatla and A. D. Belagundu, Introduction to Finite Elements in Engineering, Pearson Education, 2012 									

Course code	Course Name	L-T-P - Credits	Year of Introduction
AU334	VEHICLE TESTING LAB	0-0-3- 1	2016
Prerequisite : AU305 Vehicle maintenance			
<p>Course Objectives</p> <ul style="list-style-type: none"> • To study of various equipments / Machines used for Automobile testing applications.. • To familiarize with test process involved for diagnosis of various systems and components of an automobile. • To diagnose components of the automobile vehicle system and familiarize with trouble shooting procedure. 			
<p>List of Exercises/Experiments</p> <ol style="list-style-type: none"> 1. Checking the exhaust of gasoline vehicle with infra red gas analyzer. 2. Checking the emission of diesel vehicle with smoke meter. 3. Checking the emission using Multigas analyzer for the given vehicle. 4. Wheel alignment: Checking the camber, caster, kingpin inclination, toe in & out with optical aligner or computerized wheel aligner. 5. Removal of tyre, inspection of tyre and tube, carryout the necessary repair and reassemble with automatic or semiautomatic tire changer. 6. Wheel balancing: Balancing of wheels by using computerized wheel balancing machine. 7. Vehicle testing - Performance Testing of vehicle with chassis dynamometers (2 / 4 wheelers) 8. Checking the engine with Scan tool and familiar with DTC. 9. Brake testers: Testing of brakes using brake testers 10. Testing of Shock Absorbers. 11. Fault diagnostic of Air Conditioning System. 12. Head Light Aiming and Focusing with Head light aligners. 13. Testing auto electrical components: <ol style="list-style-type: none"> a) Battery testing - Specific gravity test, open volt test, HRD test. b) Testing generator and regulator - testing the generator for short circuit, open circuit, testing the regulator unit c) Testing and checking of spark plugs - Cleaning and testing the spark plug with spark plug cleaner & testing machine. d) Testing of ignition coil e) Checking of dwell angle and rpm. 			
<p>Expected outcome.</p> <p>The students will be able to</p> <ol style="list-style-type: none"> i. identify various systems and components in automobile and also to handle any maintenance issue in a vehicle ii. identify the troubles of the vehicles from the symptoms shown. 			
<p>Text Book:</p> <ol style="list-style-type: none"> 1. Boyce Dwiggin's – Automobile Repair guide, Theodor Audel and Co., Indiana – 1978. 2. A. W. Judge – Maintenance of high speed diesel engine, Chapman Hall Ltd. 3. A. W. Judge – Motor vehicle engine servicing 3rd edition, Pitman paper mark, London, 1969. 4. Vehicle service manuals and reputed manufacturers. 			

List of Equipment needed for the laboratory

Sl. No.	NAME OF THE EQUIPMENT	Qty.
1	Exhaust gas analyzer	1
2	Diesel Smoke Meter	1
3	Multi-gas analyser	1
4	Computerized wheel aligner	1
5	Automatic/ Semi Automatic Tyre Changer	1
6	Tyre Inflator	1
7	Computerized Wheel balancing equipment apparatus	1
8	Chassis dynamometer 2/4 wheeler	1
9	Scan Tool and new generation vehicle for	1
10	Brake tester	1
11	Shock absorber tester	1
12	Air Conditioning testing equipment.	1
13	Head light aligner	1
14	Battery test bench comprising all necessary tools to check specific gravity, open vot, HRD and provide condition of battery	1
15	Growler and regulator tester	1
16	Spark Plug testing and cleaning equipment with compressor connection	1
17	Ignition coil tester	1
18	Dwell and rpm tester	1



Course code	Course Name	L-T-P-Credits	Year of Introduction
EE312	Electrical and Electronics Engineering	3-0-0-3	2016
Prerequisite : Nil			
Course Objective			
<ul style="list-style-type: none"> To give exposure to the working of Electrical Machines that function as prime movers in industrial systems/machine-tools. To make aware on factors affecting the choice of motor for a given application To introduce power electronics which form the essential part of modern drives 			
Syllabus			
Transformers, Induction motors, Direct current machines, Control system motors, Factors affecting the choice of motor, Power Electronics			
Expected Outcome			
The students will be able to			
<ol style="list-style-type: none"> know about electrical machines that form part of various industrial systems understand the working of electric machine driven industrial systems and machine tools in a better way. 			
Text Book:			
Hughes, Edward, et al. " <i>Hughes electrical and electronic technology</i> ". Pearson education, 2008.			
References:			
<ol style="list-style-type: none"> Gross, Charles A. "<i>Electric machines</i>". CRC press, 2006. Vithayathil, Joseph. "<i>Power electronics principles and applications</i>". Tata McGraw-Hill Education, 1995. Venkataratnam, K. "<i>Special electrical machines</i>". Universities Press, 2009. Mohan, Ned, and Tore M. Undeland. "<i>Power electronics: converters, applications, and design</i>". John Wiley & Sons, 2007. Guru, Bhag S., and Hüseyin R. Hiziroglu. "<i>Electric machinery and transformers</i>", Oxford University Press, 2001. 			
Course Plan			
Module	Contents	Hours	End Sem. exam marks
I	Transformers-Operating principle, ideal and practical transformers, EMF equation, No load phasor diagram, equivalent circuit, phasor diagram of a transformer on load. Approximate equivalent circuit of transformer and its simplification. Voltage regulation, efficiency, condition for maximum efficiency, transformer tests.	9	15%
II	Three phase Induction motors- principle of action, frequency of rotor emf and current. Factors determining the torque. Torque-slip curve, comparison of slip ring and cage rotors. Single phase induction motors-capacitor run induction motor, split phase motors, shaded pole motors.	6	15%
First Internal Exam			

III	Direct current machines-general arrangement of a dc machine, calculation of e.m.f. generated in an armature winding, armature reaction, commutation. Armature and field connections. A dc machine as generator or motor. Speed of a motor, speed characteristics of shunt, series and compound motors. Torque characteristics of shunt, series and compound motors.	8	15%
IV	Control system motors-Motors for regulators, RPC system requirements, Geneva cam, stepper motor, variable reluctance motor, hybrid stepping motor, drive circuits.	6	15%
Second Internal Exam			
V	Motor selection-Factors affecting the selection motors-speed, power rating and duty cycles, load torques. The motor and its environment.	4	20%
VI	Power electronics- introduction to power electronics, thyristor circuits, limitations to thyristor operation, thyristors in practice, The fully controlled a.c./d.c. converter, ac/dc inversion. Switching devices in inverters.	9	20%
End Semester Exam			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.

Course code	Course Name	L-T-P – Credits	Year of Introduction
AU364	VEHICLE PERFORMANCE AND TESTING	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives			
<ul style="list-style-type: none"> To provide knowledge about various Vehicle Performance Characteristics. 			
Syllabus			
Laboratory testing, Dynamometers, Wheel balancing & Wheel alignment, NVH, Vehicle performance, fuel economy, road and track testing, corrosion testing, chassis dynamometers.			
Expected outcome:			
<ul style="list-style-type: none"> The students will become aware of the various testing methods of automobiles and the various equipments used for the testing of vehicles. 			
Text Books:			
<ol style="list-style-type: none"> J. G. Giles – Vehicle operation and performance, Wildlife Publications, London, 1969. SAE Transaction papers – 831814, 820346, 820367, 820371, 820375 			
References			
<ol style="list-style-type: none"> Dr. N.K.Giri- Automotive technology – Khanna publishers, 2009 W. H. Crouse and L. Anglin – Motor vehicle inspection, McGraw Hill Book Co. 1978. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Laboratory testing: Basic engine parameters, Measurement of BHP, IHP- Engine testing on dynamometers, different types of dynamometers- hydraulic, eddy current etc.	7	15%
II	Engine analyzers- for petrol and diesel engines, FIP calibrating and testing, exhaust gas analyzers - various types- Orsat apparatus, infrared gas analyzers, smoke meter; Wheel alignment testing, Wheel balancing	7	15%
FIRST INTERNAL EXAMINATION			
III	Noise vibration and Harshness: Review of vibration fundamentals, vibration control, fundamentals of acoustics, human response to sound, automotive noise criteria, Standard noise measurement methods, Noise inside and outside the vehicle, sources of vehicle noise- intake and exhaust noise, combustion noise, mechanical noise, noise from auxiliaries, wind noises, transmission noises, brake squeal, structure noise, noise control methods.	7	15%
IV	Vehicle performance: Methods for evaluating vehicle performance- energy consumption in conventional automobiles, performance, emission and fuel economy, Operation of full load and part conditions, effect of vehicle condition, tyre and road condition and traffic condition and driving habits on fuel economy, CAFÉ standards.	7	15%
SECOND INTERNAL EXAMINATION			
V	Road and track testing: Initial inspection, PDI, Initial free services, engine running in and durability, intensive driving,	7	10%

	maximum speed and acceleration, brake testing on the road, hill climbing, handling and ride characteristics, safety, mechanism of corrosion, three chamber corrosion testing, wind tunnel testing, road testing, test tracks.		
VI	Vehicle testing on chassis dynamometers: two wheel & four wheel dynamometers, vehicle testing lanes - side slip testers, brake testers, head light alignment testing	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

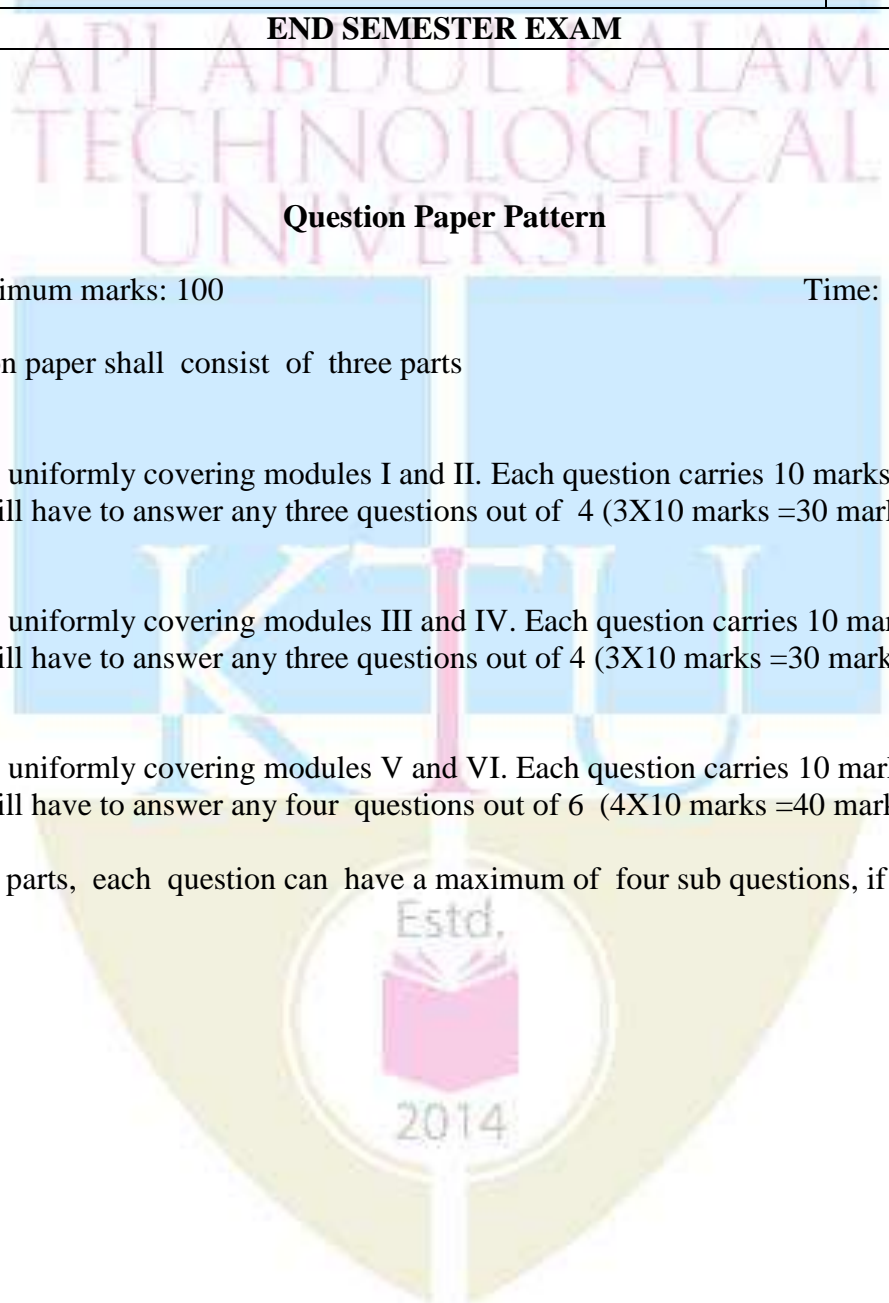
Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed



Course code	Course Name	L-T-P - Credits	Year of Introduction
AU368	Tractors and Farm Equipment	3-0-0- 3	2016
Prerequisite : Nil			
Course Objectives			
<ul style="list-style-type: none"> To impart basic knowledge about tractors and various farm machineries To understand the working of various components of tractors, various farming processes and equipment used in farming. 			
Syllabus			
Tractors – types- components- safety rules – application – layout – power unit – various systems – preventive maintenance – tillage equipment – plough – hitching – harvesting – threshing – cultivation machinery – harrows – corn drills – potato crop machinery – sugar beet crop machinery			
Expected outcome.			
Upon completion of the course, students will			
<ol style="list-style-type: none"> Be able to understand the various systems in tractors and farm equipments. Get the basic knowledge about the farming processes and equipments used in farming. 			
Text Books:			
<ol style="list-style-type: none"> Nakra C.P., “Farm machines and equipments” Dhanparai Publishing company Pvt. Ltd. Rodichev and G. Rodicheva, <i>Tractor and Automobiles</i>, MIR Publishers, Moscow, 1987. 			
References:			
<ol style="list-style-type: none"> Geleman and M. Maskovin, <i>Farm Tractors</i>, MIR. Publishers, Moscow, 1975. Guruvech A. and B. Sorekin, <i>Tractors</i>, MIR Publishers Moscow, 1975. Kolchin A. and V. Demidov, <i>Design of Automotive Engines for Tractor</i>, MIR Publishers, Moscow, 1972. Smith H. P. and L. H. Wilkes, <i>Farm Machinery and Equipment</i>, TATA McGraw Hill Publications, 1977. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Introduction to tractors -Tractors and tractors units, General Description of Tractors: Classification of tractors - Components of tractor – Safety rules. applications of tractors, Rating of Tractors, Wheeled and Crawler tractor. Layout of wheeled tractor, hydraulic control system, power take off, tractor stability and ride characteristics.	7	15%
II	Layout of crawler tractors, crawler details, methods of selection of equipments, selection of machines, basic rules for matching machines, selection of equipments including the nature of operating selection based on the type of soil, selection based on haul distance, selection based on weather conditions.	7	15%
FIRST INTERNAL EXAMINATION			
III	Power Plant in Tractors: Engine cycles – Operation of multicylinder engines - General engine performance characteristics, Cooling system - Classification - Liquid cooling system - Components, Lubricating system servicing and troubles - Air cleaner and turbo charger - Fuel tanks and filters - Fuel pumps.	7	15%

IV	Control System of Tractors: power transmission, steering system, brakes and braking system, wheels, rims and tyres and accessories of wheeled tractors, power transmission. steering clutch and braking system in crawler tractors. Preventive maintenance of engine components and various systems of a tractor.	7	15%
SECOND INTERNAL EXAMINATION			
V	Primary and Secondary Tillage equipments - DISC Plough – Mould Board Plough – Tiller and Harrows – Construction and maintenance – furrow mounted plough – plough controls - Mounting the plough – ploughing methods – systematic ploughing , round and round ploughing and one way ploughing - hitching – Three point linkage – Cage Wheel and its uses.	7	20%
VI	Harvesting – conventional and Modern Harvesters – Threshing – Principle of Paddy Threshers construction and maintenance — safety precautions. Cultivation machinery – cultivators – effects and uses of cultivator – disc harrows – spring tine cultivator – seed harrows – chain harrows –rotary cultivator – uses. Corn drills – seed metering mechanisms –Combine harvester – potato crop machinery – hand feed and automatic – sugar beet crop machinery.	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed

Course code	Course Name	L-T-P - Credits	Year of Introduction
AU372	Automotive Test Equipment	3-0-0 - 3	2016
Prerequisite : Nil			
Course Objectives			
<ul style="list-style-type: none"> To understand the different test equipment and measuring instruments used for automobile testing. 			
Syllabus			
Measurement Systems -static and dynamic measurement –closed and open loop system – Error analysis - Transducers, Modifiers and Terminating Devices - Amplifiers- filters –data Acquisition- Indicators, Printers and displays –Signal Analyzing - Mechanical Measurement - Weight, Force, torque, pressure power, temperature, fluid flow, vibration, rotational speed, velocity, acceleration and angular motion measurements - Engine Experimental Techniques: Instrumentation for performance testing of engine - Modern automotive instrumentation - Display devices - CAN network - On board diagnostics - Off board diagnostics -Vehicle tests			
Expected outcome.			
<ul style="list-style-type: none"> The students will be able to understand the fundamentals of various test equipment and measuring instruments used in automobiles and would be able to use them effectively. 			
Text Books:			
<ol style="list-style-type: none"> A.W. JUDGE, Engineering Precision Measurement, Chapman and Hall Ltd, Essex Street, W.C.,1951, J.G. Giles, Engine and Vehicle Testing, Illiffe books Ltd., London,1968. Rangan, Sharma and Mani, Instrumentation Devices and systems, Tata McGraw Hill Publishing Co., Ltd., 1990 William B.Riddens - Understanding Automotive Electronics, 5th edition- ButterworthHeinemann, Woburn- 1998 			
References:			
<ol style="list-style-type: none"> D.Patambis, Principle of Industrial Instrumentation, Tata McGraw Hill Publishing Co, New Delhi, 1990. Holman, J.P., Experimental methods for engineers, McGraw-Hill, 1988 T.G. Beckwith and Buck, Mechanical Measurements, Oxford and IBH Publishing House, New Delhi, 1995 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Measurement Systems: Introduction to Measurement systems- static and dynamic measurement –closed and open loop system - Requirements and characteristics – Analysis of experimental detail. Error analysis	7	15%
II	Transducers, Modifiers and Terminating Devices: Transducers for Automotive Applications – Amplifiers- filters –data Acquisition- Indicators, Printers and displays –Signal Analyzer	7	15%
FIRST INTERNAL EXAMINATION			

III	Mechanical Measurement: Instrumentation for measuring Weight, Force, torque, pressure power, temperature, fluid flow, vibration, rotational speed, velocity, acceleration and angular motion	7	15%
IV	Engine Experimental Techniques: Code for Engine testing – Instrumentation for performance testing of engine, Instrumentation for Research and development, Instrumentation for noise, vibration, in cylinder gas flow, flame temperature Dynamic Cylinder pressure measurements	7	15%
SECOND INTERNAL EXAMINATION			
V	Modern automotive instrumentation - computerized instrumentation system, multiplexing, sampling and advantages - Measurements - fuel quality, coolant temperature, oil pressure vehicles speed, Display devices - LED, LCD, VFD, CRT and types, CAN network, the glass cockpit and information system.	7	20%
VI	Automobile test equipments: Onboard diagnostics - fault code displays. Off board diagnostics - engine data display, Chemical, thermal, magnetic and optical gas analyzers, measurement of smoke, dust and moisture, gas chromatography, spectrometry, Vehicle tests - Laboratory tests- test tracks - Endurance Tests- crash tests- Vehicle performance test – Brake tests.	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed

Course code	Course Name	L-T-P –Credits	Year of Introduction
AU403	VEHICLE DYNAMICS	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives			
<ul style="list-style-type: none"> To familiarize the students with vibrating systems To understand the characteristics of the tires. To know about the stability and handling characteristics of vehicles at different tracks. 			
Syllabus			
Stability of vehicles-Braking requirements-Road Loads-Over steer, under steer, steady state cornering-Suspension-Tires-Performance of road vehicles-Classification of vibration-aerodynamic forces			
Expected outcome.			
<ul style="list-style-type: none"> The students will be able to solve simple design problems based on the vehicle stability and various design parameter based problems. 			
Text Book:			
<ol style="list-style-type: none"> Giri N.K, Automobile Mechanics, 8/e, Khanna Publishers Rao V. Dukkipati, Jian Pang, “Road Vehicle Dynamics problems and solution”, SAE, 2010 			
References			
<ol style="list-style-type: none"> David Corolla, ‘Automotive Engineering’, ‘Powertrain, chassis system and Vehicle Body’, Butterworth Heinmann, 2009 G. Giles, ‘Steering, Suspension and Tires, Illiffe Books Ltd., 1968. J. Y. Wong, ‘Theory of Ground Vehicles’, John Wiley and Sons Inc., New York JazarR N, Vehicle Dynamics, Springer Verlag, New York, 2014 W. Steeds, Mechanics of road vehicles, Wildlife book Ltd, London 1990. 			
Course Plan			
Module	Contents	Hours	Sem.ExamMarks
I	Classification of vibration, Specification and Vibration, Vibration System and human comforts, Modal Analysis, One DOF, Two DOF, Free and Forced Vibration, Damped Vibration, Magnification and Transmissibility, Vibration Absorber. Performance of road vehicles: Tractive resistance, tractive effort, power required for propulsion, grade ability, drawbar pull and the problems related to these terms. Road performance curves- acceleration, gradability and drawbar pull, acceleration time and Elasticity.	7	15%
II	Tires: tire dynamics Ride characteristics, Behavior while Cornering, Slip angle, Cornering force, Power consumed by Tire, Oversteer, under steer, steady state cornering, aligning moment-combined braking and Cornering, effect of camber & transient effects in cornering. Tire vibrations	7	15%
FIRST INTERNAL EXAMINATION			
III	Suspension: Vehicle dynamics and suspension	7	15%

	requirements, choice of suspension spring rate, chassis springs and theory of chassis springs, Gas & hydraulic dampers and choice of damper, damper characteristics, mechanics of an independent suspension system, Roll axis and the vehicle under the action of side forces.		
IV	Stability of vehicles: Load distribution (Three wheeled and four wheeled vehicles), Calculation of acceleration, tractive effort and reactions for different drives, stability of a vehicle on a curved track, slope and a banked road. Gyroscopic effects, weight transfer during acceleration, Cornering and braking, stability of a rigid vehicle and equations of motion of a rigid vehicle, cross wind handling.	7	15%
SECOND INTERNAL EXAMINATION			
V	Over steer, under steer, steady state cornering. Effect of braking, driving torques on steering. Effect of camber, transient effects in cornering. Directional stability of vehicles. Braking requirements, stopping distance, braking efficiency, work done in braking, tire adhesion.	7	20%
VI	Road Loads: Air resistance-Mechanics of air flow around a vehicle, pressure distribution on a vehicle, factors affecting rolling resistance, aerodynamic forces – aerodynamic drag, drag components, drag coefficient, aerodynamic aids, aerodynamic side force, lift force, pitching moment, yawing moment, rolling moment, cross wind sensitivity	7	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100,

Time: 3 hrs

The question paper should consist of three parts

Part A

3 questions uniformly covering modules I and II. Each question carries 15 marks
Students will have to answer any two questions out of 3 (2X15 marks =30 marks)

Part B

3 questions uniformly covering modules III and IV. Each question carries 15 marks
Students will have to answer any two questions out of 3 (2X15 marks =30 marks)

Part C

3 questions uniformly covering modules V and VI. Each question carries 20 marks
Students will have to answer any two questions out of 3 (2X20 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed