DR. K N MODI UNIVERSITY, NEWAI
STUDENT EVALUATION SYSTEM

Continuous Assessment

All courses undertaken by students are evaluated during the semester using internal system of continuous assessment. The students are evaluated on class /tutorial participation, assignment work, lab work, class tests, mid-term tests, quizzes and end semester examinations, which contribute to the final grade awarded for the subject. Students will be notified at the commencement of each courses about the evaluation methods being used for the courses and weightages given to the different assignments and evaluated activities.

In order to make the evaluation system as similar and transparent with any of the globally reputed educational institutions like N.I.Ts, I.I.Ts etc. the Dr. K. N. Modi University Academic Council has adopted the grading practices. Here marks obtained in the continuous assessment and end semester examination are added together and a 10-point grading system will be used to award the student with on overall letter grade for the course (subject).

Distribution of Marks

(i)Courses without Practical Components

Continuous Assessment	- 25
Mid –Term Examination	- 15
End –Term Examination	- 60
Total :	**100**

(ii)Courses with Practical Components only

Continuous Assessment	- 30
Mid –Term Examination (Practical)	- 20
End –Term Examination (Practical)	- 50
Total :	**100**

Letter Grading system

Final evaluation of course is carried out on a TEN POINT grading system. Performance Grade and Grade Points are as shown below:

Table 1

Marks	Grade Value	Grade	Description
91 to 100	10	A+	Out Standing
81 to 90	9	A	Excellent
71 to 80	8	B	Very Good
61 to 70	7	C	Good

51 to 60	6	E	Average
41 to 50	5	E	Fair
Less than 41	0	F	Fail
Absent in the University Final Examination	0	I	Incomplete

*However, within the above grading system the student has to earn a minimum of 24markseach in Continuous Assessment and End Term Examination, thatis a total of (24) + (24) =48 marks have to be secured forgetting declared pass in the *"Fair" category.*

Note: In order to convert the GPA and CGPA into percentile, multiply the same with the Conversion factor of 9.10.

A student who earns a minimum of 5 grade Point (E grade) in a course (subject) is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. A course successfully completed cannot be repeated.

A student should have appeared for the end semester examination of the prescribed course of study (mere appearance in the continuous assessment test is not sufficient) to be eligible for the award of the degree in the course.

If a student is eligible for but-fails to appeared in the end semester examination, he/she will be awarded an 'I grade (in complete) on the grade sheet. For all practical purposes an 'I'Grade is treated as an 'F'.

If a student is not eligible to appear in the end semester examination owing to his/her not fulfilling the minimum attendance requirements, he may be permitted to re-register for those courses in which he/she had attendance shortage, at the next available opportunity.

Grade Point Average (GPA) &Cumulative Grade Point Average (CGPA)

Each course grade will be converted into a specific number of points associated with the grade as mentioned in above Table 1. Here points are weighted with the number of credits assigned to a course. The Grade Point Average (GPA) is the weighted average of grade points awarded to a student. The Grade Point Average for each semester will be calculated only for those students who have passed all the courses of that semester. The weighted average of GPA's of all semester that the student has completed at any point of time is the Cumulative Grade Point Average (CGPA) at that point of time.

CGPA upto any semester will be calculated only for those students who have passed all the courses upto that semester.

Calculation of GPA and CGPA :

Example:
Table 2

Courses	Credits	Letter Grade	Grade Value	Credit Value	Grade Points
Mathematics	3	C	7	3x7	21
Chemistry	3	B	8	3x8	24
Physics	3	A	9	3x9	27
Language Lab	2	B	8	2x8	16
TOTAL	11			TOTAL	88

In this case GPA = $\frac{\text{Total Grade Points}}{\text{Credits}} = \frac{88}{11} = 8.0$

Suppose the GPAS in two successive semesters are 7.0 and 8.0 with 26 and 24 respective course credits, then the

CGPA = $\frac{7x26+8x24}{26+24} = \frac{374}{50} = 7.48$

After the results are declared, grade cards will be issued to each student which will contain the list of courses for that semester and the grades obtained by the student, as well as GPA of that semester. However, a conversion factor of "9.1", will be included, enabling students and future employers for transforming CGPA into percentage of marks at par with the existing practices of I.I.Ts, N.I.Ts and A.I.C.T.E.

Minimum Eligibility Requirements in Dr. K. N. Modi University for proceeding to the next academic year of study.

A First year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the 3rd Semester of next academic year.

"Pass with Minimum E Grade in Four Theory Papers & Pass in Four Laboratory Papers in the I & II Semester (Combined)"

A Second year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the Vth Semester of the next academic year.

"Pass with Minimum E Grade in Four Theory Papers & Pass in Four Laboratory Papers in the IIIrd& IV Semester (Combined)"

A Third year Student of Dr. K. N. Modi University satisfying the below mentioned requirements is eligible to study in the VIIth Semester of the next academic year.

"Pass with Minimum E Grade in Four Theory Papers & Pass in Four Laboratory Papers in the Vth& VI Semester (Combined)"

AUTOMOBILE ENGINEERING

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
B.Tech(Automobile Engineering) Effective from session 2013-14
Year-II Semester-IVthsem (Automobile Engineering)

	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	02BTME401	Fluid mechanics	3	1	0	40	60	100	4
2	02BTME402	Engineering thermodynamics	3	1	0	40	60	100	4
3	02BTME403	Mechanics of solids	3	1	0	40	60	100	4
4	02BTAS401	Mathematics IV	3	1	0	40	60	100	4
5	02BTEC402	Control system	3	1	0	40	60	100	4
6	02BTME406	Operation research	3	1	0	40	60	100	4
Lab									
1	02BPME401	Fluid mechanics lab.	0	0	2	50	50	100	1
2	02BPME408	Mechanical measurements & control lab	0	0	2	50	50	100	1
3	02BPME409	Strength of materials lab	0	0	2	50	50	100	1
4	02BPME410	Production practice	0	0	2	50	50	100	1
5	02BP4010	Seamless Learning	0	0	4	100		100	1
6	02BP4011	Co-Curricular Activities	0	0	4	100		100	1
		Total	**18**	**6**	**16**				**30**

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
B.Tech(Automobile Engineering) Effective from session 2013-14
Year-III Semester-Vthsem (Automobile Engineering)

Automobile Engineering V SEMESTER

	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	03BTME501	Machine Design- I	3	1	0	40	60	100	4
2	03BTCH503	Heat Transfer	3	1	0	40	60	100	4
3	03BTME503	Thermal Engineering	3	1	0	40	60	100	4
4	03BTME506	Industrial Engineering	3	1	0	40	60	100	4
5	03BTME505	Dynamics Of Machine - I	3	1	0	40	60	100	4
6	03BTAE501	Automotive Transmission	3	1	0	40	60	100	4
LAB									
1	03BPME501	Machine Design- I Lab	0	0	2	50	50	100	1
2	03BPME503	Thermal Engineering Lab	0	0	2	50	50	100	1
3	03BPME505	Dynamics Of Machine Lab -I	0	0	2	50	50	100	1
4	03BPCH503	Heat Transfer lab	0	0	2	50	50	100	1
5	03BP5010	Seamless Learning	0	0	4	100		100	1
6	03BP5011	Co-Curricular Activities	0	0	4	100		100	1
		Total	**18**	**6**	**16**				**30**

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
B.Tech (Automobile Engineering) Effective from session 2013-14
Year-III Semester-VIthsem (Automobile Engineering)

Automobile Engineering VI SEMESTER

	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	03BTAE601	Auto chassis and auto system design	3	1	0	40	60	100	4
2	03BTAE602	Dynamics of Machine – II	3	1	0	40	60	100	4
3	03BTAE603	Design of machine element II	3	1	0	40	60	100	4
4	03BTAE604	Vehicle Dynamics	3	1	0	40	60	100	4
5	03BTAE605	Auto Emission and pollution control	3	1	0	40	60	100	4
6	03BTAE606	Automatic heating, ventilation and air conditioning	3	1	0	40	60	100	4
LAB									
1	03BPAE607	DOM – II Lab	0	0	2	50	50	100	1
2	03BPAE608	Vehicle dynamics lab	0	0	2	50	50	100	1
3	03BPAE609	AHV&AC Lab	0	0	2	50	50	100	1
4	03BPAE610	AC& ASD lab	0	0	2	50	50	100	1
5	03BP6010	Seamless Learning	0	0	4	100		100	1
6	03BP6011	Co-Curricular Activities	0	0	4	100		100	1
		Total	**18**	**6**	**16**				**30**

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
B.Tech (Automobile Engineering) Effective from session 2013-14
Year-IV Semester-VIIthsem (Automobile Engineering)

	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	04BTAE701	Advanced IC Engine II	3	1	0	40	60	100	4
2	04BTAE702	Product Development	3	1	0	40	60	100	4
3	04BTAE703	CAD/CAM	3	1	0	40	60	100	4
4	04BTAE704	Microprocessor application in automobile	3	1	0	40	60	100	4
5	04BTAE705	Vehicle Aerodynamics and vehicle body Engg	3	1	0	40	60	100	4
6	04BTAE706	Quality control	3	1	0	40	60	100	4
LAB									
1	04BPAE701	I C engines lab-II	0	0	2	50	50	100	1
2	04BPAE703	CAD/CAM lab	0	0	2	50	50	100	1
3	04BPAE705	Body engineering lab	0	0	2	50	50	100	1
4	04BPAE709	Industrial visit / Seminar	0	0	2	50	50	100	1
5	04BP7010	Seamless Learning	0	0	4	100		100	1
6	04BP7011	Co-Curricular Activities	0	0	4	100		100	1
		Total	**18**	**6**	**16**				**30**

DR. K. N. MODI UNIVERSITY

Study and Evaluation Scheme
B.Tech (Automobile Engineering) Effective from session 2013-14
Year-IV Semester-VIIIthsem (Automobile Engineering)

Automobile Engineering VIII SEMESTER

	Sub Code	Subject Name	Period			Evaluation Scheme			Credit
						Continuous Assessment	Final Exam	Total	
			L	T	P				
1	04BTAE801	Alternative Fuels and Engine Tribology	3	1	0	40	60	100	4
2	04BTAE802	Industrial robotics	3	1	0	40	60	100	4
3	04BTAE803	Automotive Maintenance Management	3	1	0	40	60	100	4
4	04BTAE804	Earth moving equipment	3	1	0	40	60	100	4
5	04BTAE805	Mechatronic	3	1	0	40	60	100	4
LAB									
1	04BPAE806	Auto Maintenance lab	0	0	2	50	50	100	1
2	04BPAE807	Auto Reconditioning lab	0	0	2	50	50	100	1
3	04BPAE808	Seminar	0	0	2	50	50	100	1
4	04BPAE809	Major Project	0	0	2	100	100	200	5
5	04BP8010	Seamless Learning	0	0	4	100		100	1
6	04BP8011	Co-Curricular Activities	0	0	4	100		100	1
		Total	**15**	**5**	**16**				**30**

FOURTH SEMESTER

02BTME401 - FLUID MECHANICS

Course Objective:

To provide an introduction to the basic principles and methods of fluid analysis.To provide practical exercises to strengthen the student's knowledge of components.To make students aware about the entrepreneurial opportunities in fluid engineering field.

UNIT -1

Basic Definitions and Fluid Properties ; Definition of Fluid, Incompressible and compressible fluids, Fluid as a continuum, Mass, Density, specific weight, relative density, specific volume, Bulk modulus, velocity of sound Ideal fluid Viscosity. Newtonian and Non Newtonian fluid, Kinematic viscosity, Effect of temperature and pressure on viscosity, surface tension capillarity, vapour pressure and cavitation. Fluid Statics : General differential equation, Hydrostatics Manometry, Fluid forces on submerged surfaces. Curved surfaces, Aerostatics, Isothermal atmosphere, polytropic atmosphere. The international standard atmosphere, static stability The international standard atmosphere submerged bodies. Floating bodies.

UNIT -2

Kinematics and conservation of Mass : Flow classifications. Fluid velocity and acceleration, streamlines and the stream function. Pathlines and streak lines. Deformation of a fluid element, verticity and circulation. Irrotational and Rotational flow. Flownet, Laplace equation. Conservation of mass and the continuity equation for three dimensions.

Fluid Momentum : The Momentum theorem Applications of the momentum theorem Equation of motion, Euler's equation of motion Integration of Euler's equation of motion.

Bernoulli's equation. Applications of Bernoulli's Pitot tube, Equation of motion for Viscous fluid, NavierStoke's equation.

UNIT -3

Orifice discharging free, Jet, vena contracts, co-efficient of contraction, velocity and discharge, coefficient of resistance. Orifices and mouthpieces Nozzles and weires.

Flow Through Pipes :Reynold's experiment Darcy's Weisback equation. Loss of head due to sudden enlargements, contraction, entrance, exit obstruction, bend, pipe fittings. Total and Hydraulic grandient lines, Flow through pipe line. Pipes in series, parallel Transmission of power through pipes.

UNIT -4

Laminar Flow: Simple solution of Navier Stokes equations. Hagen – Poiseuille flow. Plans Poiseuille flow and coutte flow.

Turbulent Flow; Variation of friction factor with Reynold's number. The Prandt Mixing length hypothesis applied to pipe flow, velocity distribution in smooth pipes, sough pipes. The Universal

pipe friction laws, Colebrook. White formula.

Dimensional Analysis: Buckingham variables, Model Similitude, Force ratio, Reynolds, Froude's

Mach, Weber and Euler numbers and their applications. Undistorted model distorted model scale effect.

UNIT -5

The Boundary Layer: Description of the boundary layer. Boundary Layer thickness boundary layer separation and control. The Prandtl boundary layer equation. Solution for cominar boundary
layer. The momentum equation for the boundary layer. The flat plate in uniform free stream with no pressures gradients. Approximate momentum analysis laminar boundary Aerofoils Theory. Flow round a body ; Drag skin friction drag, pressure drag, combined skin friction & pressure drag (Profile drag) wave drag, lift induced drag. Flow past sphere & Cylinder.

Reference Books-

1. FLUID MECHANICS- K L KUMAR
2. FLUID MECHANICS - R K BANSAL
3. FLUID MECHANICS AND FLUID MACHINE - D S KUMAR

02BTME402 - ENGINEERING THERMODYNAMICS

Course Objective:

1.Study of Power Station performance evaluation & economic analysis.
2. Study of various non-conventional energy sources & principles of energy conservation& audit.

UNIT 1

Basic Concepts of Thermodynamics :Thermodynamics system, control volume, Properties, state, processes
and cycle, equality of temperature, Zeroth Law of thermodynamics, temperature scale, laws of perfect gas,
Pure substances, vapour-Liquid –solid-phase equibriumin a pure substances, thermodynamic surfaces

UNIT 2

Work and heat, Law of conservation of mass and energy, First law of thermodynamics, steady state
Processes, Second law of thermodynamics, Heat engine, Carnot cycle, thermodynamic temperature scale,
entropy, change of entropy for different processes, equivalence of Kelvin plank and clausius statements,
clausius inequality.

UNIT 3

Available and unavailable energy, availability of a non flow and steady flow system, Helmbeltz and Gibb's
functions, Thermodynamic Relations: Important mathematical relations, Maxwell relations, Tds Relations,
Joule-Thomson coefficient, Clayperon relation.

UNIT 4

Air – standard power cycle, Brayton cycle, Otto cycle, diesel cycle, Dual cycle, Stirling cycle, Ericssion cycle
and Atkinson cycle, Mean effective pressure and efficiencies, Four stroke petrol and diesel engine, Two
stroke Petrol and diesel engine.

UNIT 5

Properties of steam, phase change process, use of steam table &molier char. Rankine cycle, Reheat cycle,
Regenerative cycle, cogeneration vapour compression refrigeration cycle.

Reference Books-

1. ENGINEERING THERMODYNAMICS – P K Nag
2. ENGINEERING THERMODYNAMICS – C P Arora
3. ENGINEERING THERMODYNAMICS – Mathur Mehta

02BTME403- MECHANICS OF SOLIDS

Course Objective:

To provide an introduction to the basic principles and methods of design analysis.To provide practical exercises to strengthen the student's knowledge of components.To make students aware about the entrepreneurial opportunities in design engineering field.

Unit – 1

Stress & strain: Tension, compression, shearing stress & strain; Poisson's ratio: Stress-strain relationship, Hooke's law; equations of static = w for 2D & 3D cars Elastic constants and their relations for a isotropic
hookean material, anisotropy &orthotropy, thermal stresses, composite bars; simple elastic, plastic &visco-elastic behavior of common materials in tension and compression test, stress-strain curves. Concept
of factor of safety & permissible stress. Conditions for equilibrium. Concept of free body diagram;
Introduction to mechanics of deformable bodies.

Unit – 2

Members subjected to flexural loads: Theory of simple bending, bending moment and shear force diagrams
for different types of static loading and support conditions on beams. Bending stresses, Section modulus
and transverse shear stress distribution in circular, hollow circular, I, Box, T, angle sections etc.

Unit – 3

Principal planes, stresses & strains: Members subjected to combined axial, bending & Torsional loads,
maximum normal & shear stresses; Concept of equivalent bending & equivalent twisting moments:
Mohr's circle of stress & strain.
Theories of Elastic Failures: The necessity for a theory, different theories, significance and comparison,
applications.

Unit – 4

Torsion: Torsional shear stress in solid, hollow and stepped circular shafts, angular deflection and power transmission capacity. Stability of equilibrium: Instability & elastic stability. Long & short columns, ideal strut, Euler's formula for crippling load for columns of different ends, concept of equivalent length, eccentric loading, Rankine formulae and other empirical relations.

Unit – 5

Transverse deflection of beams: Relation between deflection, bending moment, shear force and load, Transverse deflection of beams and shaft under static loading, area moment method, direct integration method: method of superposition and conjugate beam method. Variational approach to determine deflection and stresses in beam.
Elastic strain energy: Strain energy due to axial, bending and Torsional loads; stresses due to suddenly applied loads; use of energy theorems to determine deflections of beams and twist of shafts. Castigliano's theorem.Maxwell's theorem of reciprocal deflections.
Reference Books-

1. Strength of Material – B C Punimiya
2. Strength of Material- Ramamuthram

MATHEMATICS IV
CODE:02BTAS401

Course objective: The main objectives of this course are to train the students to read and write mathematical proofs; to develop the students' mathematical problem solving skills; and to familiarize the students with standard concepts in discrete mathematics.

Unit 1: Differential Calculus:

Asymptotes and Curvature (Cartesian Coordinates Only) Concavity, Convexity and Point of Inflexion (Cartesian Coordinates Only) Curve Tracing (Cartesian and Standard Polar Curves – Cardioids, Lemniscates of Bernoulli, Limacon, And Equiangular Spiral

Unit 2: Statistics-I

Statistics and its Role in Scientific Description of data sets by Graphs and Tables, Summerizing Data sets using Measures of Central Tendency and Variation, Elements of Probability, Properties

of Probability Counting Techniques, Conditional Probability/Bayes' Formula, Independent Events/Random Variables/Types of Random Variables.

Unit 3: Statistics-II

Cumulative Distribution Function, Expected values and its properties, Bernoulli, Binomial, Poisson, Geometric, Hypergeometric random variables, Normal Random Variables, Exponential, Gamma, chi-square , t and F distributions, The normal approximation to the Binomial distribution/Random Sampling/Statistical Sampling Distributions, Distribution of the Sample Mean and the Central Limit, Theorem of Normal Population Sampling Distribution from a Normal Population/Sampling from a Finite Population.

Unit 4: Curve fitting and Regression analysis

Methods of least square and curve fitting of straight lines and parabola, solutions of cubic and bi quadratic equations.

Unit 5: Calculus of variations

Functional, strong and weak variations simple variation problems, the Euler's equation.

Reference Books:

1) Higher Engineering Mathematics , B. S. Grewal, Khanna Publications
2) Engineering Mathematics Vol. 3, H.K. Dass, S. Chand Publishers

02BTEC402- CONTROL SYSTEM

Course Objective:

To provide an introduction to the basic principles and methods of control system analysis.To provide practical exercises to strengthen the student's knowledge of components.To make students aware about the entrepreneurial opportunities in control system engineering field.

UNIT 1 : CONTROL SYSTEMS ANALYSIS AND COMPONENTS:

Examples and application of open loop and close loop systems.Brief idea of multivariable control system, Brief idea of Z-transform and digital control systems.Differential equations. Determination of transfer function by block diagram reduction technique & signal flow graph method.

UNIT 2 : TIME RESPONSE ANALYSIS OF FIRST ORDER & SECOND ORDER SYSTEMS:

Transient response analysis.Steady state error & error constants.Dynamic error and dynamic error coefficient, Performance Indices.

UNIT 3 : FREQUENCY DOMAIN METHODS & NETWORKS:

Bode plot, Design specification in frequency domain and their co-relation with time domain, Lag, lead and log lead networks, brief idea of proportional, derivative and integral controllers.

UNIT 4: STABILITY OF THE SYSTEM:
Absolute stability and relative stability.Routh's stability criterion, Hurwitz criterion. Root locus method of analysis. Polar plots, Nyquist stability criterion. M and N loci.
UNIT 5 : STATE VARIABLE ANALYSIS:
Concepts of state, state variable and state model. State models for linear continuous time systems. Brief idea of state variable analysis in discrete time domain. Transfer functions, Solution of state equation. Concepts of controllability &observability.
Reference Books:
1.Control system- Ogata

02BTME406 : OPERATION RESEARCH

Course Objectives:
Study of quantitative techniques in management decision-making and its applications by using mathematical models. Create awareness about preparation of Project Plan.
UNITI
Introduction To Linear Programming (LP), Introduction to applications of operations research in functional areas of management. Linear Programming-formulation, solution by graphical and simplex methods (Primal - Penalty, Two Phase), Special cases.Dual simplex method.Principles of Duality.Sensitivity Analysis.
UNITII
Linear programming, Transportation Models (Minimising and Maximising Cases) – Balanced and unbalanced cases – Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogel's approximation methods. Check for optimality. Solution by MODI / Stepping Stone method.Transhipment
Assignment Models (Minimising and Maximising Cases) – Balanced and Unbalanced Cases. Solution by Hungarian and Branch and Bound Algorithms.Travelling Salesman problem.Crew AssignmentModels.
UNITIII
Integer Linear Programming And Game Theory
Solution to pure and mixed integer programming problem by Branch and Bound and cutting plane algorithms. Game Theory-Two person Zero sum games-Saddle point, Dominance Rule, Convex Linear Combination (Averages), methods of matrices, graphical and LP solutions.
UNITIV
Dynamic Programming, Simulation And Decision Theory
Dynamic Programming (DP) – Deterministic Cases-Maximising and Minimising problems. Decision making under risk – Decision trees – Decision making under uncertainty. Application of simulation techniques for decision making.
UNIT V – Queuing Theory and Replacement Models. CPM and PERT
Reference Books
1.Operation Research – Mahajan
2.Operation Research- Heera gupta

02BPME401 - FLUID MECHANICS LAB.

NAME OF EXPERIMENTS

1. Determine Metacentric height of a given body.
2. Determine Cd, Cv& Cc for given orifice.
3. Determine flow rate of water by V-notch.
4. Determine velocity of water by pitot tube.
5. Verify Bernoulli's theorem.
6. Determine flow rate of air by Venturi meter
7. Determine flow rate of air by orifice meter
8. Determine head loss of given length of pipe.
9. Determine flow rate of air by nozzle meter.
10. Study of Pelton, Kaplan Turbine models.

02BPME408 - MECHANICAL MEASURMENTS LAB

1. Displacement Measurement using Capacitive Pick -up System
2. Displacement Measurement Using Inductive Pick-up System
3. Displacement Measurement Using Light Dependent Register Set up

(i) Displacement v/s Registance at Constant Voltage

(ii) Voltage v/s Registance at Constant Displacement

4. Study of Speed Measurement System

(i) Magnetic Pick-up

(ii) Strobometer

5. Study of Load Measurement System Load Cell + Load Indicator
6. Calibration of Thermocouple Wire.

Problems on

- Block diagram reduction technique
- Block diagram formation for Control Systems.
- Root Locus Plot
- Bode Plot
- Polar plot &Nyquist Stability Criterion Experiments on
  (1) Hydraulic System
  (2) Control System

02BPME403 - STRENGTH OF MATERIALS LAB

1.Izod Impact testing.
2. Rockwell Hardness Testing.
3. Spring Testing
4. Column Testing for buckling
5. Torsion Testing
6. Tensile Testing
7. Compression Testing
8. Shear Testing
9. Brinell Hardness Testing
10. Bending Test on UTM.
11. Study of Fatigue Testing Machine.

02BPME410- PRODUCTION PRACTICE I

- Study of lathe machine, lathe tools cutting speed, feed and depth of cut.
- To perform step turning, knurling and chamfering on lathe machine as per drawing.
- Taper turning by tailstock offset method as per drawing.
- To cut metric thread as per drawing.
- To perform square threading, drilling and taper turning by compound rest as per drawing.
- To study shaper machine, its mechanism and calculate quick return ratio.
- Study of single point cutting tool geometry & grind the tool as per given tool geometry.
- Study the milling machine, milling cutters, indexing heads and indexing methods.
- To prepare a job on shaper from given MS rod.
- Study of capstan lathe.
- Study the effect of Carbon percentage on the hardness of Steel.

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V SEMESTER

3BTME501 - MACHINE DESIGN- I

Course Objective:
To provide an introduction to the basic principles and methods of design analysis. To provide practical exercises to strengthen the student's knowledge of components. To make students aware about the entrepreneurial opportunities in design engineering field.

UNIT -1
Materials: Properties and IS coding of various materials, Selection of material from properties and economic aspects.
Manufacturing aspects in Design : Selection of manufacturing processes on the basis of designand economy, Influence of rate of production, standard size, Influence of limits, fits tolerances and surface finish. Change in the shape of the designed element to facilitate its production, Design of castings, working drawing.

UNIT -2
Design for strength: Allowable stresses, detailed discussion on factor of safety (factor of ignorance): Stress concentration. Causes & mitigation. Introduction of various design considerations like strength, stiffness, weight, cost, space etc. Concept of fatigue failures. Design of machine elements subjected to direct stress, Pin, cotter and keyed joints, Design of screw fastening.

UNIT -3
Design of members in Bending: Beams, levers and laminated springs.

UNIT -4
Design of members in torsion : Shafts and shaft couplings.

UNIT -5
Design of shafts, brackets under combined stresses, Calculation of transverse & torsional deflections. Screw fasteners subjected to eccentric loading.

Reference Books -

1. Machine Design – R S khurmi
2. Machine design – V B Bhandari

03BTME503 THERMAL ENGINEERING

Unit 1

Steam Boilers and Draft:
Steam generators-classifications. Working of fire-tube and water-tube boilers, boiler mountings & accessories, air pre heater, feed water heater, super heater. Boiler performance, Boiler efficiency, Equivalent evaporation. Natural& Artificial drafts, Chimney height, Maximum draft and chimney efficiency, Boiler heat balance sheet.

Unit-2

Steam Turbines: Classification, Impulse Turbine- Flow through blades, velocity diagram, power output and efficiency, maximum blade efficiency of single stage impulse turbine, blade friction, compounding of impulse turbine. Reaction Turbine-Flow through impulse reaction blades, degree of reaction, velocity diagram, power output, efficiency and blade height, comparison of impulse and impulse reaction turbines. Losses in steam turbines, stage efficiency, overall efficiency and reheat factor. Governing of steam turbines, Problems.

Unit-3

Air Compressors: Working of a single stage reciprocating air compressor; calculation of work input; Volumetric efficiency; Isothermal efficiency; Advantages of multi stage compression; Two stage compressor with Inter-cooling; Perfect Inter cooling; Optimum intercooler pressure. Root and vane blowers; Static and total head values; Centrifugal compressors- Velocity diagrams, slip factor, ratio of compression, pressure coefficient, pre-whirl; Axial flow compressor- Degree of reaction, polytrophic efficiency, surging, choking and stalling, performance characteristics. Problems.

Unit-4

Steam Condensers: Elements of a condensing plant, types of condensers, comparison of jet and surface condensers. Condenser vacuum, sources of air leakage & its disadvantages, vacuum efficiency and condenser efficiency, Problems.

Unit-5

Vapour Power Cycles: Carnot and Rankine vapour cycles, effect of operating conditions on thermal efficiency of Rankine cycle, Rankine cycle with superheat, reheat and regeneration, Binary vapour cycle, Problems.

Text Books:

1. Thermal Engineering - R.K.Rajput, Lakshmi Publishers
2. Thermal Engineering – P L Ballaney, Khanna Publishers
3. Thermodynamics and Heat Engines vol. II – R Yadav, Central Publishing House

3BTME505 - DYNAMICS OF MACHINES – I

UNIT -1

Kinematics: Elements, pairs , mechanisms, four bar chain and its inversions, velocity and acceleration, Klein's construction, coriolis component, instantaneous center method, synthesis of mechanisms, panto graph, scott- Russel, Tchbeicheff straight line, indicator diagram mechanisms.

UNIT -2

Automotive Vehicle Mechanisms: Overhead valve mechanism, Davis and Ackerman steering mechanism, Trifler suspension and Hooke's joint.

Power Transmission: Belts and ropes, effect of centrifugal force, creep, chain drive.

UNIT -3

Friction: Laws of static, dynamic and rolling friction, dry and viscous friction, inclined plane and screw jack, pivots and friction axis, bearing, clutches, theory of film lubrication.

UNIT -4

Brakes and Dynamometers: Band, block and band and block brakes, braking action, absorption and
transmission type dynamometers, prony, rope and hydraulic dynamometers braking system of automobiles.

UNIT -5

Cams: Type of cams, displacement, velocity and acceleration curves for different cam followers, consideration of pressure angle and wear, analysis of motion of followers for cams with specified contours.

List of Recommended Books

1. Theory of Machines, Rattan S.S., Tata McGraw Hill.
2. Theory of Machines, Thomas Bevan, Pearson Education.
3. Theory of Machines and Mechanisms, Uicker, Pennocle and Shigley, Oxford University Press.
4. Mechanism and Machine Theory, Ambekar A. G., Prentice-hall Of India
5. Theory of Mechanisms and Machines, Sharma and Purohit, Prentice-hall Of India
6. Theory of Mechanisms and Machines, Ghosh A., Affiliated East West Press.
7. Theory of Machines, Abdulla Shariff, Dhanpat Rai Publication

03BTME506 - INDUSTRIAL ENGINEERING

Course Objectives:

1.Study of quantitative techniques in management decision-making and its applications by using mathematical models.

2. Create awareness about preparation of Project Plan.

Subject Code:

Course Objective: The course aims to develop the skills of the students in the area Industrial management and their problems. This will be necessary for understanding the Industry system.

UNIT l:-

Introduction: concept, development, application and scope of Industrial management.Productivity: Definition, measurement, productivity index, types of production system, industrial ownership.

UNIT 2:-

Management Function: Principles of Management – Management Tools – time and motion study production planning, specification of Production requirements.

UNIT 3:-

Inventory Control: Inventory cost, Deterministic models, Introduction to supply chain management.

UNIT4:-

Building construction, Inspection of site, high rise building, Fire protection introduction , Earth quake, Lightning and electrical hazard protection, Building construction, Building materials, Plan reading and method, Standard, symbols, designation, Personal hazards, Fire escape structural precaution, Fire hazard in a building, Building collapse and symptoms, Fire tower/fire escape.

UNIT 5:-

Environmental Issues: Environmental pollution – various management techniques to control Environmental pollution – various control Acts for Air, Water, Solid waste and Noise Pollution

Reference Books -

Industrial Engineering – O P khanna

03BTAE501- AUTOMOTIVE TRANSMISSION

Unit-1

Transmission requirements: Requirements of transmission system, general arrangements for power transmission for front engine, rear engine vehicle, four wheel drive vehicle, dead axle and axle less transmission. Clutch: Single plate, multi plate clutch, centrifugal clutch, electromagnetic clutch, constructional details, torque capacity and clutch friction materials.

Unit- 2

Gear box: Requirements of gear box, sliding mesh gear box, constant mesh gear box, synchromesh gear box, epicyclic gear box, velocity ratio and gear ratio for vehicle, performance characteristics in different speed , overdrive.

Unit- 3

Hydrodynamic drive: Fluid Coupling : principle of operation, constructional details, torque capacity and performance curve. Torque converter : principle of operation, constructional details, torque capacity and performance curve. Multistage torque converter, converter fluid.

Unit- 4

Hydrostatic drive: Various types of hydrostatic system, working principle of hydrostatic system, advantage and limitations, Jenny hydrostatic drive, comparison of hydrostatic and hydrodynamic drive. Electric drive: Principle of electric drive, Early ward Leonard control system, Modify Leonard control system, advantage of electric drive, limitation of electric drive.

Unit- 5

Automatic Transmission: Need for automatic Transmission, Chevrolet turbo glide transmission system, torque flite, Automatic transmission fluid, effect of automatic transmission on vehicle performance and fuel economy.

04BTCH503 - Heat Transfer

Course Objective:
To provide an introduction to the basic principles and methods of heat transfer analysis. To provide practical exercises to strengthen the student's knowledge of components. To make students aware about the entrepreneurial opportunities in heat transfer engineering field.

UNIT 1:
Introduction to Heat Transfer Processes: Conduction and radiation, Fourier's law of heat conduction, thermal conductivity, thermal conductivity of solids, liquids and gases, effect of temperature on thermal conductivity, Newton's law of cooling, definition of overall heat transfer coefficient, general parameters influence the value of heat transfer coefficient.
Conduction : General 3-Dimensoinal conduction equation in Cartesian, cylindrical and spherical coordinates, different kinds of boundary conditions, nature of differential equations, one dimensional heat conduction with and without heat generation, electrical analogy, heat conduction through composite walls, critical thickness of insulation.

UNIT 2:
Heat Transfer from Finned Surfaces: fin efficiency and effectiveness, two dimensional steady state heat conduction using analytical and numerical methods, periodic heat conduction.
Convection: Review of Navier–Stokes and energy equation, hydrodynamic and thermal boundary layers, laminar boundary layer equations, forced convection appropriate non dimensional members, effect of prandtl number, empirical relations for flow over a flat plate and flow through pipes.

UNIT 3
Natural Convection: Dimensional analysis, grashoff number, boundary layers in external flows (flow over a flat plate only), boundary layer equations and their solutions, heat transfer correlations.
Heat Transfer with Change of Phase: Nature of vaporization phenomena, different regimes of boiling heat transfer, correlations for saturated liquid vaporization, condensation on flat plates, correlation of experimental results, drop wise condensation.

UNIT4
Heat Exchanger: Different types of heat exchangers, arithmetic and logarithmic mean temperature differences, heat transfer coefficient for parallel, counter and cross flow type heat exchanger, effectiveness of heat exchanger, N.T.U. method, fouling factor, constructional and manufacturing aspects of Heat Exchangers.

UNIT 5
Thermal Radiation: Plank distribution law, Kirchhoff's law, radiation properties, diffuse radiations, Lambert's law, radiation intensity, heat exchange between two black bodies heat

exchanger between gray bodies, shape factor, electrical analogy, reradiating surfaces heat transfer in presence of reradiating surfaces.

List of Recommended Books

1. Heat Transfer, Holman J.P., Tata McGraw-Hill, New Delhi.
2. Heat and Mass Transfer, Cengel, Tata McGraw-Hill, New Delhi.
3. Heat and Mass Transfer, Kumar D.S., Kataria and Sons.
4. Heat Transfer, Sharma and Lal, Vardhan Publisher Jaipur.
5. Heat and Mass Transfer, Nag P.K., Tata McGraw-Hill, New Delhi.

03BPME501 - MACHINE DESIGN LAB -I

1. Selection of material & IS coding
2. Selecting fit & assigning tolerances
3. Examples of Production considerations.

Problems on

1. Knuckle & Cotter joints
2. Torque : Keyed joints & shaft couplings
3. Design of screw fastening
4. Bending : Beams, Levers etc.
5. Combined stresses : Shafts, brackets, eccentric loading.
6. Design for rigidity (Transverse / Torsional

03BPME503 - THERMAL ENGINEERING LAB - I

1. Study of Water tube boilers
2. Study of Fire tube boilers
3. Study of Lancashire Boiler
4. Study of Cochron Boiler
5. Study of Locomotive Boiler
6. Study of Babcocks & Will Cox Boiler
7. Study of Vertical Boiler
8. Study of mountings and asseceries of boilers.
9. Study of Air compressor.
10. Study of different steam turbine

03BPME505 - DYNAMICS OF MACHINES LAB - I

1. To study inversion of four bar chain
2. Coupling Rod
3. Beam Engine
4. Steering Mechanism
    (a) Study of quick return mechanism.(Crank and Slotted lever mech.)
    (b) To draw velocity and acceleration diagram for Crank and slotted lever mechanism.
5. Study of inversion of
    (a) Double slider chain
    (b) Oldhan Coupling
    (c) Scotch Yoke
    (d) Elleptical Trammel
6. To plot displacement v/s θcurve for various cams.
7. Study of various cam-follower arrangements.
8. To determine co-efficient of friction.
9. Study of various types of dynamometers, Brakes and Clutches.
10. To determine moment of inertia of the given object using of Trifler suspension.

03BPCH503 - HEAT TRANSFER LAB

1. To Determine Thermal Conductivity of Insulating Powders.
2. To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3. To Measure the thermal Conductivity of Liquid.
4. To determine the transfer Rate and Temperature Distribution for a Pin Fin.
5. To Measure the Emissivity of the Test plate Surface.
6. To Determine Stefan Boltzmann Constant of Radiation Heat Transfer.
7. To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8. Determination of Heat Transfer Coefficient in Drop Wise and Film Wise condensation.
9. To Determine Critical Heat Flux in Saturated Pool Boiling.
10. To Study Performance of Simple Heat Pipes.
11. To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat Exchangers.
12. To Find the Heat transfer Coefficient in Forced Convection in a tube.
13. To determine the total thermal conductivity and thermal resistance of the given compound resistance in series.
14. To find out the thermal conductivity of given slab material.
15. To determine the individual thermal conductivity of different lagging in a lagged pipe.
16. To study the rates of heat transfer for different materials and geometries
17. To understand the importance and validity of engineering assumptions through the lumped heat capacity method.
18. Testing and performance of different heat insulators.

SIXTH SEMESTER

03BTAE601: AUTO CHASSIS AND AUTO SYSTEM DESIGN

Unit-1

Introduction of Auto System Design: Aspects of Auto Design, Design Procedure, Principle of Design, Classification of design, Basic requirements of design, Quality of Design Engineer.

Unit -2

Automotive chassis and chassis frame: general considerations related to chassis layout, power plant location, weight distribution, stability, types of frame, materials, calculation of stresses on sections construction details, loading points, testing of frames in bending and torsion.

Unit – 3

Design of Clutch: Types of friction clutches, requirements of clutches, general design consideration, design the equation for power transmitted through single plate and multi plate clutch for Uniform wear and uniform pressure, design for dimensions of clutch, equation for centrifugal clutch.

Unit – 4

Design of Brake: General design considerations, braking efficiency, braking torque on the shoe, effect of expanding mechanism of shoes on braking torque, braking of vehicle for two wheel drive and four wheel drive, braking of vehicle for curved path calculation of mean lining pressure and heat generation during brake operation.

Unit – 5

Design of Suspension System: Function suspension system in automobile, design of helical coil spring, leaf spring, materials for spring, standard sizes of automobile suspension spring. Propeller Shaft: Design of Propeller shaft, Design of universal Joint.

03BTAE602: DYNAMICS OF MACHINES II

Course Objective:

To provide an introduction to the basic principles and methods of mechanism analysis. To provide practical exercises to strengthen the student's knowledge of components. To make students aware about the entrepreneurial opportunities in machine engineering field.

UNIT l:-

Governors: Watt, Porter, Proell, Hartnell and spring controlled governors, governor effort, power, stability, inertia effects.

UNIT 2:-

Gyroscope: Principle of gyroscopic couple, effect of gyroscopic couple and centrifugal force on vehicle taking a turn, stabilization of sea vessels. Inertia force analysis: Velocity and acceleration of slider crank and four bar mechanism, inertia force, piston thrust and forces on connecting rod, turning moment diagram,flywheel.

UNIT 3:-
Gears: Law of gearing, terminology, tooth form, standard interchangeable tooth profile, minimum number of teeth on pinion in contact with gear or rack, interference and undercutting, bevel, helical and spiral gears.
UNIT 4:-
Gear trains: Simple, compound, reverted and epicyclic gear trains, analytical, tabular, graphical and vector methods for velocity ratio, gear boxes- sliding and constant mesh for automobiles.
UNIT 5:- Balancing: Balancing of rotating masses, balancing of reciprocating masses, locomotives, IC engines, balancing machines.
Reference Books -
1. Dynamics of machine – R S Khurmi
2. Dynamics of machine –S S Ratan

03BTAE603 : DESIGN OF MACHINE ELEMENTS II

Course Objective:
To provide an introduction to the basic principles and methods of design analysis. To provide practical exercises to strengthen the student's knowledge of components. To make students aware about the entrepreneurial opportunities in design engineering field.
Unit 1
Fatigue Considerations in Design: Variable load, loading pattern, Endurance stresses, influence of size, surface finish, notch sensitivity & stress concentration. Goodman line, Soderberg, Design of machine members subjected to combined, steady and alternating stresses. Design for finite life. Design of Shafts under Variable Stresses.
Unit 2
Design of welded joint. Design of screw jack. Design of helical compression, tension, torsional springs. Springs under variable stresses. Design of belt, rope and pulley drive system, selection of chain & sprocket drive systems.
Unit 3
Engine parts: I.C. engine design. Design of cylinders and heads. Design of pistons. Design of cross-head,connecting rods and crank shafts.
Unit 4
Design of gear teeth, Lewis and Buckingham equations; wear and dynamic load considerations, Design and force analysis of spur, helical, bevel and worm gears. Bearing reactions due to gear tooth forces.
Unit 5
Design of sliding & journal bearing; method of lubrication, hydrodynamic, hydrostatic,boundary etc. Minimum film thickness and thermal equilibrium.Selection of anti-friction bearings for different loads and load cycles. Mounting of the bearings.Method of lubrication, selection of oil seals.
Reference Books -
1. MACHINE DESIGN – V B Bhandari
2. MACHINE DESIGN – P C Sharma,

03BTAE604 VEHICLE DYNAMICS

Unit-1

Introduction; Vehicle Dynamics Definitions as prescribed by SAE, Newtonian and lagrangian formulations of multibody systems. Handling and stability characteristics: Steering geometry, fundamental equations for true rolling, Ackerman steering gear. Steady state handling neutral steer, under steer and over steer, steady state response, yaw velocity, lateral acceleration, curvature response, directional stability

Unit-2

Performance characteristics of road vehicle;Various forces opposing vehicle motion, their nature and factors affecting these forces. Tractive effort and power available from the engine, equation of motion, maximum tractive effort and weight distribution, stability of vehicle on slop, road performance curves, acceleration, gradability, drawbar pull. Transient operation of vehicles: inertia effects, equivalent mass, equivalent moment of inertia, time taken in synchronization during change of gears, effect of flywheel inertia on acceleration, dynamic of vehicles on banked track, gyroscopic effects , net driving power.

Unit-3

Braking performance; Braking of vehicles, brakes applied to rear wheels, front wheel and all four wheels, motion on straight and curved path, mass transfer effects, braking efficiency, stopping distance, reaction time and stopping time, brake locking anti lock drives, calculation of mean lining pressure and heat generation during brakes.

Unit-4

Vehicle ride characteristics: Human response to vibration, vehicle ride models, road surface profile as a random function, frequency response function, evaluation of vehicle vertical vibration to ride comfort criterion.

Unit-5

Two wheeler dynamics: Stability & handling, vehicle motion ride control, various vehicle models, gyroscopic effect, effect of tyre and vehicle parameter on stability and handling characteristic.

03BTAE605: AUTO EMISSION AND POLLUTION CONTROL

Unit-1

Engine emissions and air pollution: Constituents of engine exhaust responsible for air pollution and their effect on human health, plant ecology, ozone layer depletion and global warming, Photochemical smog, greenhouse gases. Kyoto protocol and carbon trading. Formation of Pollutants: Combustion generated and other pollutants, general mechanisms and kinetics of formation of carbon-monoxide, unburnt hydrocarbon, oxides of nitrogen and particulate matter due to combustion, effect of air-fuel ratio on emissions, extended Zeldovitch mechanism for formation of NOx, soot and smoke formation.NOx-particulate trade-off.

Unit-2

Emissions from Spark ignition engines: Types of emission form spark ignition engines, importance of mixture formation, lean and rich mixture, study of various mechanism of formation of unburnt hydrocarbon, effect of various design and operating variables on formation of CO, UBHC and NOx. Discussion on different technologies for reducing engine out emissions from a spark ignition engine, gasoline port injection and gasoline direct injection. Evaporative emissions and their control.

Unit-3

Emissions from Compression Ignition engines: Types of emissions from compression ignition engine, effect of various design and operating variables on formation of NOx, smoke and particulate matter. Discussion of various technologies for reducing engine out emissions from a compression ignition engine such as turbo charging, inter-cooling, fuel injection pressure, injection timing retard, exhaust gas recirculation (EGR) etc.

Unit-4

Exhaust Aftertreatment: Need for exhaust aftertreatment, fundamentals of catalytic converters, three-way catalyst, diesel oxidation catalyst, diesel particulate filter, effect of fuel sulfur on aftertreatment devices.

Emission Test Procedures: Various test cycles for emission testing of two-three wheelers, passenger cars, utility vehicles, light and heavy duty commercial vehicles used in India, Europe, Japan and USA. Test procedures for various types of evaporative emissions.

Unit-5

Study of emission standards for two-three wheelers, passenger cars, utility vehicles, light and heavy duty commercial vehicles used in India, Europe, Japan and USA. Equipment for Emission Measurements: NDIR analyzers, Flame ionization detector, chemiluminescence analyzer, constant volume sampling, measurement of smoke and particulate matter.

03BTAE606: AUTOMOTIVE HEATING, VENTILATION AND AIR CONDITIONING

Unit-1

Air conditioning fundamentals:, fundamentals of refrigeration, basics of vehicle air conditioning system, location of air conditioning component in a car – schematic layout of a refrigeration system, component like compressor, condenser, fan blower, expansion device – expansion valve calibration , evaporator pressure regulator ,low and high pressure switch.

Unit –2

Air conditioning heating system: automotive heaters – manually controlled air conditioner – heater system –automatically control air conditioner – air conditioning protection with heater diagnosis chart.

Unit –3

Refrigerants: Introduction ,classification, properties, selection criteria, commonly used refrigerants, eco friendly refrigerants, global warming and ozone forming potential of refrigerants, containers, handling of refrigerants.

Unit-4

Psychrometry: Introduction, Psychrometric properties, Inside and outside design conditions of air conditioning system. Air distribution: introduction, factors affecting design of air distribution system, types of air distribution system, air flow through the dashboard recirculating unit, duct system, ventilation, vacuum reserve

Unit-5

Air conditioning maintenance and service : cause of air conditioner failure, trouble shooting of air conditioning system, servicing heater system, removing and replacing components, leak testing, compressor service, charging and discharging, performance testing.

03BTAE607- DYNAMICS OF MACHINES LAB. - II

1. To verify the relation $T=I\omega\omega_p$ for gyroscope.
2. To plot force vs. radius and lift vs. speed curves for governors.
3. To plot pressure distribution curves on a journal bearing.
4. To perform wheel balancing.
5. To perform static and dynamic balancing on balancing set up.
6. To determine mass moment of inertia of a flywheel.
8. Study of a sliding mesh automobile gear box.
9. Study of a planetary gear box.
10- Study of a lathe gear box.

03BPAE608 : VEHICLE DYNAMICS LAB

1. Study of Vehicle stability test.
2. To perform static and dynamic balancing on balancing setup.
3. To perform the wheel balancing test.
4. Study of various parameter at the time of application of brake (Braking efficiency & stopping distance , Reaction time and stopping time)
5. Study of Antilock braking system.
6. Study of different steering system used in automobile.
7. Study of ride comfort in Vehicle.

03BTAE609 : AUTOMOTIVE HEATING, VENTILATION AND AIR CONDITIONING LAB

List of Experiments :

1. To determine C.O.P. and draw P-H and T-S diagrams.of vapour compression Refrigeration System
2. To find C.O.P.of Mechanical heat pump.
3. To study the Air and Water heat pump and find its C.O.P.
4. To study the cut- sectional models of Reciprocating and Rotary Refrigerant compressor.
5. To study the various controls used in Refrigerating & Air Conditioning systems.
6. To study the Ice- plant, its working cycle and determine its C.O.P and capacity.
7. To study the humidification, heating, cooling and dehumidification processes and plot them on Psychrometric charts.
8. To determine the By-pass factor of Heating & Cooling coils and plot them on Psychrometric charts on different inlet conditions.
9. To determine sensible heat factor of Air on re-circulated air-conditioning set up.
10. To study the chilling plant and its working cycle.

03BPAE610 : AC&ASD LAB

Problem Solve:

1. Fatigue Loading
2. Helical compression tension, torsional and leaf spring
3. Design of Weldments
4. Curved Beams
5. Clutches and brakes
6. Belt Rope and Chain Drive
7. Gear Design
8. Bearing Design
9. Design of flywheel

VII SEMESTER

04BTAE701: ADVANCED IC ENGINE II

Unit-1

Combustion in Spark Ignition Engines: Thermodynamic analysis of SI engine combustion, burned mass fraction, analysis of cylinder pressure data, combustion process characterization, flame structure and speed. Cycle-to-cycle variation-causes, effects measurement and control, Ignition systems,

Unit-2

Combustion in Compression Ignition Engines: Types of diesel combustion systems, direct injection systems, indirect injection systems, their comparison. Fuel injection-fuel spray behavior, overall spray structure, atomization, droplet size distributions, Sauter Mean Diameter, Spray penetration, wall wetting and its effect.

Unit-3

Modern Development in I.C. Engine: Diesel Engine Developments: Electronic injection systems: Distributor systems, Common Rail Fuel Injection systems; Unit injectors; multiple injections, rate shaping. Trends
injection nozzle designs, sac volume, VCO nozzles.

Unit-4

Gasoline Engine Developments: Gasoline Port Injection (GPI). Gasoline Direct Injection (GDI) Stratifies Charge Engines, Lean Burn Engines. Special developments: Variable Valve Timing (VVT), Variable Swirls Concepts, Variable Geometry Turbochargers (VGT), two valves vs. four valve engines.

Unit-5

Unconventional Engines: Rotary Engines, Variable compression ratio engines, free piston engine. Hybrid vehicles, Fuel Cells.

04BTAE702 : PRODUCT DEVELOPMENT

Unit-1

Introduction to Product Design: Asimov's model, definition of production design, design by evolution, design by innovation. Essential factors for product design. Morphology of design. Process capability.Tolerance in detailed design and assembly.

Unit-2

Product Design Practice: Introduction, product strategies. Time to market, analysis of the product, basic design considerations, standardization, preferred numbers, simplification, role aesthetics in product design, functional design, criteria and objectives of design. Strength, stiffness and rigidity considerations in Product design, principle stress trajectories (force flow lines), balanced design, designing for uniform strength.

Unit-3

Design for production: Producibility requirements for machine components, design for casting, forging, presswork, role of manufacturing process in design, design of ease of machining.

Design for assembly and disassembly. Optimization of Design: Design approaches, optimization by differential calculus, Lagrange multipliers, linear programming, geometric programming. Johnson's method of optimum design.

Unit-4

Ergonomic and economic factors in design: Human being as applicator of forces, anthropometry, design of controls, displays. Man-machine interaction; product value vs. cost; economic considerations, economics of new product design (Samuel Elion Models).

Unit-5

Modern Approached to Product Design: Concurrent design, simultaneous engineering, Quality Function Deployment (QFD), Product development cycle, Program management.

04BTAE703: CAD/CAM

Unit-1

Introduction: Role of computers in design and manufacturing. Influence of computers in manufacturing environment. Product cycle in conventional and computerized manufacturing environment. Introduction to CAD and CAM. Advantages and disadvantages of CAD and CAM Hardware for CAD: Basic hardware structure, working structure, working principles, usages and types of hardware for CAD. Input/output devices, memory, CPU, hardcopy and storage devices.

Unit-2

N C System: Definition, applications, Historical background Role of Computers in Manufacturing. Numerical Control in CAM: Definition , Historical Background, basic components of NC system, Fundamentals of NC: Procedure, Coordinate system, motion control systems, Advantages of NC systems.Economic of NC.machining centers.

Unit-3

Part Programming: Numerical control part programming: punched tape, tape coding & format. Manual part programming, Computer aided part pragramming NC part programming languages. Automatically programmed, tools programming (APT). Description of compact & NC programming with interactive graphics.

Unit-4

Computer Numerical Control: Principle of operation of CNC, Features of CNC, Development in CNC systems, Adaptive Control, Direct Numerical Control (DNC) Standard Communication interfaces, Programmable Logic Controllers (PLCs) Communication networks, Trends* New Development in NC.

Unit-5

Robot Technology: Introduction, Industrial Robots, Robot physical Configuration, Basic Robot motions, Technical features such as work volume, precision of movement speed of movement, weight carrying capacity, type of drive systems, Introduction to Robot Languages, End Erectors, work cell control and interlocks, Robotic sensors, Robot applications& economics, Intelligent robots, interfacing of a vision system with a Robot.

04BTAE704 : MICROPROCESSOR APPLICATION IN AUTOMOBILE

Unit-1

Architecture: General 8 bit microprocessor and its architecture 8085, Z-80 and MC 6800 MPU and its pin function: Architecture-Function of different sections.

Unit-2

Instruction Set: instruction format-addressing modes-instruction set of 8085 MPU-TSTATE-Machine cycle and instruction cycles-Timing diagrams-Different machine cyclesFetch and execute operations-estimation of execution times.

Unit-3

Assembly Language Programming: Construct of the language programming-Assembly format of 8085-Assembly Directive-Multiple precision addition and subtraction-BCD to Binary and Binary to BCD, Multiplication, Division, Code conversion using look up tablesStack and subroutines.

Unit-4

Data Transfer Schemes: Interrupt structure-Programmed I/O-Interrupt driven I/O, DMASerial I/O. Types of interfacing devices: Input/Output ports 8212, 8255, 8251, 8279. Octal latches and tristate buffers-A/D and D/A converters-Switches, LED's ROM and RAM interfacing.

Unit-5

Applications: Data acquisitions- Temperature control-Stepper motor control-Automotive applications Engine control, Suspension system control, Driver information.

04BTAE705 :VEHICLE AERODYNAMICS AND VEHICLE BODY ENGINEERING

UNIT-1

Introduction: Importance of vehicle design in modern automobile industries. Criteria for vehicle body design, Types of frame , construction details, loading points, testing of frames in bending and torsion. Different types of metal joining process used in vehicle body construction.

UNIT-2

Car Body Details: Types : Saloon , Convertibles, Limousine, Sedan , Hatchback , Racing and sports car. Car visibility- driver's visibility, regulation , visibility test, method of improving visibility and space in cars , Safety in design of car , Car body construction. Bus Body Details : Types: Mini bus, single Decker bus, Double Decker bus, articulated bus , Bus body layout , floor height, engine location, entrance and exit , seat layout , seat dimension. Construction details- frame construction , double skin construction, types of metal section used , conventional and integral type construction. Commercial vehicle Details: Types of body : Flat platform , drop side , fixed side , tipper body , tanker body , light commercial vehicle body types – dimension of driver seat in relation to control- Driver cabin design.

UNIT –3

Vehicle aerodynamics: Introduction , Aerodynamics forces , Drag, Drag reduction , stability and cross winds various body optimization technique for minimum drag, Wind tunnel testing, Scale model testing,

UNIT-4

Body Load: symmetric & asymmetrical vertical loads in car. different load case in vehicleBending case , Torsion case, Combined bending and torsion , lateral loading Idealized structure – Structural surface –shear panel method.

Body material trim and mechanism: Steel sheet , timber , plastic , GRP, FRP , Properties of materials- corrosion – anticorrosion method. Selection of paints and various processes. Body trimming process- dent beating tools, riveting method, welding method. Body mechanism- door lock mechanism , window glass winding mechanism.

UNIT-5

Safety in vehicle design: Basics of impacts protection, design for crashworthiness , front impact and side impact analysis, bumper system , energy absorbent forms. Indian Motor acts and its application- The motors vehicle acts 1988, Driving license , Registration of vehicles, Rules of the road, Motor Insurance.

04BTAE706: QUALITY CONTROL

Unit 1

Quality Concept And Management: Evolution of quality control, Quality characteristics, need of control , quality objective and quality policy, quality cost, quality of design, conformance, Objective and application of Statistical quality control, process capability analysis. Quality assurance, Concept of TQM, ISO 9000 and ISO 14000 system

Unit 2

Control Chart :General theory of control chart, control chart for variable and attributes, Group Control chart, moving average and moving range charts, acceptance control chart, CUSUM chart, difference control charts

Unit 3

Sampling Plans: Fundamental Concepts of acceptance sampling, multiple and sequential sampling plans, acceptance sampling by variables, sampling plans using different criteria. comparison of various types of sampling plans.

Unit 4

Life testing and Reliability: Models of probability of equipment failure, Exponential failure, density, MTTF, Weibull failure ,concept of reliability, designing for reliability,
Maintainability, Reliability measurement and test

Unit 5

Quality Management: Philosophies of Deming ,Juran, Ishikawa and Philip Crossby, Seven Quality tools, Quality circle, Kaizen, Concept of poka yoke,5 S campaign, Six sigma, Quality function deployment, Benchmarking

04BPAE701: IC ENGINE LAB-II

1. Assembly and dismantling of multi point fuel injection.
2. Determine the following engine performance properties for each observation: engine brake power (KW), engine brake torque (N-m), Brake specific fuel consumption (kg/kWh), and brake mean effective pressure (kPa).
3. To perform preventive maintenance of the ignition, fuel, cooling and lubricating systems.
4. Perform laboratory course covering the basics of automotive electric and electronic. Study of circuit construction emphasizing meter usage, including analog, digital and oscilloscopes.
5. To perform computerized engine control systems including sensor testing, onboard diagnosis, scan tool use and fuel injector testing, cleaning and preventive maintenance.
6. Study of electronic fuel injection system.
7. Study of Common rail direct injections engine.
8. Study of various sensor and Electronic control module used in automobile.
9. Study of Electronic fuel pump.
10. Study of alternative fuels used in I.C. Engine.

04BPAE703 : CAD/CAM LAB

1. Analysis of simple automotive components by using FEM package.
2. Auto lisp programming – writing and execution of at least 3 programs (2D only)
3. Using Pro/E or any other standard solid modular getting a hardcopy of 4 different automotive 3D objects.
4. a). Study of NC Machine and simulation of cutting/milling operations using CAM package.
   b) Machining and simulation of at least two jobs using NC Machine /CAM package.
5. Clutch Complete design of clutch component, components and assemblies drawing using drafting software.
6. Gear Box : Gear train calculation , Layout of gear box , calculation of bearing loads and selection of bearing. Complete assembly drawing using drafting software.

04BPAE705: BODY ENGINEERING LAB

1. Perform the visibility test on the vehicle.
2. Study of different types of tool used in body shop
3. Perform the various joining processes welding, riveting) in the body material.
4. Assembling and dismantling of various body mechanisms like door lock mechanism, window winding machine mechanism, passenger seat mechanism.
5. Perform the dent beating process on the metal sheet.
6. Study and perform the various painting process on the car.
7. Make the different scale model (Bus body model, TATA 407 model).
8. Study of Modern vehicle design.
9. Study of vehicle crash analysis.

04BPAE709 : Practical training + Industrial visit

VIII SEMESTER

04BTAE801: ALTERNATIVE FUELS AND ENGINE TRIBOLOGY

Unit-I

Introduction: estimation of petroleum reserves, need for alternative fuels, availability and properties of alternative fuels. Merits and demerits of alternative fuels. Alcohols: properties of alcohol as SI engine fuel, ethanol and methanol, ethanol- gasoline blends, methanol -gasoline blend, combustion characteristics in the fuel engines, performance and emission characteristics.

Unit-II

Compressed natural gas, LPG and biogas, availability of CNG properties, modification required to use in engine- performance and emission characteristics of CNG vehicles SI and CI Engines. Use of LPG in SI engine: performance and emission for LPG. Biogas generation, properties, performance and emission characteristics, storage, handling and safety aspects,

Unit-III

Bio-diesel: different sources of vegetable oils use of straight vegetable oils in engine, - Transetherification, bio-diesel, bio-diesel properties and standards, biodiesel blends. Engine performance and emission characteristics with use of biodiesel and its blends, worldwide trends in use of bio diesel.

Hydrogen : hydrogen as SI engine fuel, properties combustion characteristics, port injection, timed injection, direct injection of hydrogen in engines, backfire arrest, performance and emission characteristics, production, storage and handling, safety aspects.

Unit-IV

Engine Tribology of Fundamentals: function of engine lubrication, fundamental of lubrication-regimes of lubrication-hydrodynamic, mixed and boundary lubrication, elasto hydrodynamic lubrication, description of engine components working of each of these regimes .

Unit-V

Engine Lubrication System: engine lubrication system and their components, bearing lubrication, lubrication of piston, ring and liners, mechanisms of lubricating oil consumption, method of measuring engine oil consume\ptin, positive crank case ventilation. Cylinder liner and its fitment, characterization and measurement of cylinder liner surface finish, oil filters- full flow and bypass filters, importance of air filter, wet and dry air filtration. Wear of different engine parts.

Lubricating Oils: classification and service rating of lubricating oils, detailed study of different properties of lubricating oils, oil additives, oil drain intervals and used oil analysis, oil coolers.

04BTAE802 : INDUSTRIAL ROBOTICS

Unit-1

Introduction : Automation and robotics, Brief history of robotics , Development in robotics, Economics aspects of robots, Advantage and disadvantage of using robots I industries. Overview of robots – Present and future applications.

Production Design for Robotic Assembly: Production design for robotic and automatic assembly, consideration for assembly oriented product design. Robot safety.

Unit –2

Classification and structure of robotic system :.Classification, Geometrical configurations, wrist and its motions, End effectors and its type, links and joints. Robot drive system : – Hydraulic, Electric and pneumatic drive system, Resolution, accuracy and repeatability, Advantage and disadvantage of drive system.

Unit –3

Control system and components: Basic control system concept and models, Transfer function and block diagram of spring mass system, Controllers – proportional, proportional and integral, proportional and derivative, PID, transient and response to second order system. Robot actuation and Feedback component – position, velocity sensors.

Unit-4

Robot arm kinematics: Introduction, Direct and inverse kinematics, rotation matrix, rotation matrix about an arbitrary axis, Homogeneous transformation, links, joint and their parameters, D-H representation.

Trajectory Planning: Introduction, general consideration on trajectory planning, joint interpolated trajectory, planning of Cartesian path trajectories

Unit –5

Robot programming and languages : introduction, manual teaching, lead through teaching, programming language – AML and VAL, storing and operating, Task programs. Sensors: Internal state sensors, tactile sensor, proximity sensing, range sensing, force torque sensor, elements of computer vision, sensing and digitizing function in machine vision- sampling-quantization-encoding-image storage. Image processing and analysis, feature extraction and object recognition. Artificial intelligence

04BTAE803 : AUTOMOTIVE MAINTENANCE & MANAGEMENT

Unit-1

Automobile maintenance: Importance of maintenance, scheduled and unscheduled maintenance. Preparation of check lists, analysis of breakdown, preventive measures, unit replacement system, maintenance schedule, chassis lubrication schedule, component retrieval, estimating repair cost, maintenance record, warranty period, servicing. Inspection forms. Log books.Trip sheets.Other maintenance record forms.

Garage Practice: Types of service station/garage, layout of garage. Factors affecting layout, tools& equipments, transport service undertakings, design a layout for different garage.

Unit-2

Engine Maintenance: Dismantling of engine components, cleaning methods, visual inspection and dimensional check of various engine components, minor and major tune up, reconditioning and repairing methods of engine components. Assembly procedure, special tools used for maintenance, repair and overhauling. Cooling systems- Anti corrosion and antifreeze solutions, radiator, and thermostat. Lubrication oil topping up, oil change, oil relief valve; fuel feed systems, FIP adjustment and testing, injector testing.

Unit-3

Chassis and drive line maintenance: mechanical automotive type gear box- mechanical automatic types. Final reduction, propeller shaft, front and rear suspension systems, brake systems-hydraulic, servo, air. Air bleeding, steering system, axles, wheel alignment- tires.

Unit-4

Electric system maintenance: Battery testing method, starter motor, charging system- a DC generator, AC alternator, regulator, ignition system- coil ignition, transistor assisted ignition, capacitor discharge ignition. Electric horn, wiper motor, flasher, electric fuel pump, gauges. Lighting system- head lights focusing.Wiring harness testing.

Unit-5

Body repair: minor body panel beating, tinkering, shouldering, , Painting : Introduction of automotive paints , types of paints, corrosion and anticorrosion method, rubbing polishing, working of paint booth ,door lock mechanism, window glass actuation mechanism.

04BTAE804: EARTH MOVING EQUIPMENT

Unit-1

Fundamentals soil and machinery, equipments and operation, different types and purpose, System of Earth Moving Equipments:-

(a) Engine- All systems of engine and special features like automatic timer, turbochargers, after collars etc.

(b) Transmission- Basic types and planetary transmission constructional and working principles. Hydro shift automatic Trans torque converters, retarders, Trans hydraulic circuits and controls valves.

(c) Hydraulics- Basic components of hydraulic systems like pumps (types), control valves, relief valves and hydraulic motors, hydraulic cylinders.

Unit-2

(a) Final Drive- Types of reductions, structure and function suspensions like hydraulic suspension.

(b) Brakes and Steering- Hydraulic power steering, main components and circuit. Tyre brakes and components and functions.

(c) Under carriage- Tyre and tracked vehicle, advantages and disadvantages, tractor and components.

Unit-3

Earth Moving Equipments Management-

(a) Earth moving equipments maintenance- Type of maintenance schedules, purpose and advantages, organization set ups and documentation.

(b) Method of selection of equipments- selection of machine, basic rules of matching machine, selection of equipment including the nature of operation, selection based on type of soil, based on haul distance, based on weather condition.

Unit-4

Calculation of operation capacity and estimating owning and operating cost: Methods of calculation operating capacity, calculation of productivity of bulldozer shovel, wheel landers and dump truck. Owing cost and operating cost.

Unit-5

Construction and working of earthmovers:- Tractors, Crane, Bulldozer, army tanks, Safety methods and attachments for earth moving equipments, hydraulic lift, Differential lock. Trolley, shovel and scrapers.

04BTAE805: MECHATRONICS

Unit-1

INTRODUCTION: Definition and an overview of mechatronics, design of mechatronics system. Objectives, advantage and disadvantage of mechatronics. Microprocessor based controllers. System and design – mechatronics approach, modeling, and simulation, man – machine interface.

Unit-2

SENSORS AND SIGNAL CONDITIONING: Classification of transducers, development in transducers technology, (no detailed discussion on different type of transducers), classification of sensors, principle of working and application of light sensors, proximity sensors and hall effect sensors. Concept, necessity op-amps protection, filtering, and wheat stone bridge- Digital- Multiplexer. Data acquisition.

Unit-3

MICROPROCESSOR: Introduction, 8085 A processor architecture and terminology – such as, CPU, memory and address, ALU, assembler, data, register, fetch cycle, write cycle, state bus, interrupts. 8085 pin diagram. Micro controller. Difference between microprocessor and micro controller.

Unit-4

ELECTRICAL ACTUATOR: Classification of actuator system with examples, mechanical switches. Concept of bouncing method of preventing bouncing of mechanical switches. Solenoid relays. Solid state switches- diode thyristor, triacs, transistors, and Darlington pair. Electrical actuator, stepper motor, permanent magnet motor servo motor, servo system, derives circuit, open and closed loop control.

Unit-5

HYDRAULIC ACTUATOR: valves – classification, pressure control valves, pressure relief valves, pressure regulating valves, pressure sequence valve. Direction control valves – sliding spool valve, solenoid operated. Symbol of hydraulic element. Hydraulic cylinder – constructional features, classification and application. Hydraulic motor - types vane motors and piston motors, application.

EXAMPLE OF MECHATRONIC SYSTEM: Robotics, manufacturing, machine – diagnostic, road vehicles

04BPAE806: AUTO MAINTENANCE LAB

1. Study and practice on service station equipments and their specifications and servicing of vehicles.
2. Study of the faults in the electrical systems such as headlights, side or parking lights, trafficator lights, electric horn, starter and charging system, wind screen wiper.
3. Simple tinkering and soldering works of body panel, study of door lock and window glass rising mechanisms.
4. Adjustment of pedal play in clutch, brake and hand brake lever and steering wheel play; air bleeding from hydraulic brakes and diesel fuel system
5. Wheel bearing, tightening and adjustment.
6. Removal and fitting of tires and tubes.
7. Drawing of general wiring diagram of various vehicles, like mopeds, scooters, Motorcycles, cars.

04BTAE807 : AUTO RECONDITIONING LAB

1. Study and practice of engine analyzer.
2. study and practice of wheel alignment (Mechanical and computerized) and wheel balancing.
3. Testing of vehicle on chassis dynamometer and models on wind tunnel.
4. Study and practice on

a. Connecting rod alignment
b. Cylinder re-boring machine
c. Valve re-facing machine
d. Brake drum skimming machine

5. Study and practice on

a. Fuel injection pump calibration equipment
b. Nozzle tester
c. Nozzle grinding machine

6. Study of tyre re-treading and vulcanizing.
7. study and practice on body repair- tinkering and painting
8. Heat light focusing test and visibility test
9. experimental study of microprocessors as applied to automobiles.