UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Economics for Engineers
Course Code: HU801
L-T Scheme: 3-0 **Course Credits: 3**

Module-I

1. Economic Decisions Making – Overview, Problems, Role, Decision making process.

2.EngineeringCosts&Estimation– Fixed, Variable, Marginal & Average Costs, Sunk Costs ,Opportunity Costs, Recurring And Non recurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models-Per-Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement &Learning Curve, Benefits.

Module-II

3. Cash Flow, Interest and Equivalence: Cash Flow Diagrams, Categories & Computation, Time Value of Money, Debtre payment, Nominal & Effective Interest.

4. Cash Flow & Rate Of Return Analysis–Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Break even Analysis. Economic Analysis In The Public Sector – Quantifying And Valuing Benefits & drawbacks.

Module-III

5.Inflation And Price Change Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.

6. Present Worth Analysis: End-Of Year Convention, View point Of Economic Analysis Studies, Borrowed Money View point, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.

7. Uncertainty In Future Events-Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options.

Module-IV

8. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods,

Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.

9. Replacement Analysis- Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum Cost Life Problems.

10. Accounting–Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Books:

1. James L. Riggs, David D. Bedworth, Sabah U. Randhawa: Economics for Engineers 4e, Tata Mc Graw-Hill

2. Donald Newnan, Ted Eschembach, Jerome Lavelle: Engineering Economics Analysis, OUP

3. John A. White, Kenneth E. Case, David B. Pratt: Principle of Engineering Economic Analysis, John Wiley

4. Sulliv anand Wicks: Engineering Economy, Pearson

5. R. Paneer Seelvan: Engineering Economics, PHI

6. Michael RLindeburg : Engineering Economics Analysis, Professional Pub***Readings***

1. JamesL.Riggs,DavidD.Bedworth,SabahU.Randhawa:Economicsfor Engineers 4e,TataMcGraw-Hill

2.DonaldNewnan,TedEschembach,JeromeLavelle:Engineering EconomicsAnalysis,OUP

3.JohnA.White,KennethE.Case,DavidB.Pratt: Principle of Engineering EconomicAnalysis,JohnWiley

4.Sullivanand Wicks:EngineeringEconomy,Pearson

5.R.Paneer Seelvan:Engineering Economics, PHI

6.MichaelRLindeburg :Engineering EconomicsAnalysis,Professional Pub

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Energy Conservation & Management
Course Code: ME 801C
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

Energy conservation refers to the reducing of energy consumption through using less of an energy service. Energy conservation differs from efficient energy use, which refers to using less energy for a constant service.Driving less is an example of energy conservation. Driving the same amount with a higher mileage vehicle is an example of energy efficiency. Energy conservation and efficiency are both energy reduction techniques. Energy conservation is a part of the concept of sufficiency.

Objectives:

1. To understand and appreciate the energy crisis and environmental concerns associated with the energy management, and the importance of energy conservation.
2. To know the techniques of energy analysis and the associated energy efficient technologies for the routinely used thermal and electrical energy systems.
3. To understand the energy management systems and their essential elements.
4. To acquire the knowledge and the basic skills for energy monitoring, energy bench marking, energy action planning and energy auditing.

Learning Outcomes:

At the end of the course, the student will be able to

1. Becoming aware of the energy crisis, and of environmental and sustainability concerns associated with the energy management.
2. Appreciating the importance of energy conservation and having the knowledge of energy conservation strategies and methods.
3. Understanding the Energy Management Systems (EnMS) and their essential elements.
4. Becoming aware of the Energy Conservation Act, 2001, and of the legal energy requirements applicable to the routinely used thermal and electrical energy systems Aware.
5. Exposure to the most used energy planning and management softwares.

Course Contents:

UNIT-I

Introduction: Energy resources; New and renewable energy resources; Energy forms and energy technologies; Energy and environmental concerns; Energy scenario and energy crisis; energy resources management and energy conservation – principles; Potential areas industries; Agriculture and municipal for energy conservation; Conservation methods.

UNIT-II

Energy efficient technologies in thermal systems: Fuels and combustion; Boilers and turbines; Cogeneration and combined cycles; DG sets; Circulating cooling water systems; Steam system and condensate systems and insulation; Heat exchangers; Multiple effect evaporations; Furnaces; Thermo-compressors and mechanical vapour compressors; Waste heat recovery and reuse.

UNIT-III

Energy efficient technologies in electrical systems: Electrical motors and drives; Pumps; Fans and Blowers; Air compressors and compressed air systems; Buildings and space heating and lighting systems; HVAC systems.

UNIT-IV

Energy management: Supply side and demand side management; Energy conservation methods; Energy management systems; Energy monitoring; Energy review and energy bench marking; Energy action planning; Energy auditing.

UNIT-V

Energy policy and legislation: Energy policy; Energy conservation act; 2001; Energy managers and energy auditors; Energy labeling and energy standards

TEXT BOOKS:

1. Energy Management- Murphy WR, G Mckay- Butterworth Heinmann, 2007
2. Energy Mangement, Audit & Conservation-De Barun,
, Vrinda Publications, Delhi, 2007
3. Eastop & Croft- Energy Efficiency, Longman, 1990
4. Turner- Energy management Handbook, 2nd Ed., Fairmont Press, 1993

REFERENCES:

1. Practical guide to energy conservation – a ready reckoner on energy conservation measures; Petroleum Conservation Research Association (2009).
2. Indian Energy Board-2012; World Energy Council.
3. Reay DA, Industrial energy conservation; Pergamon Press (1979).
4. White LC, Industrial Energy Management and Utilization; Hemisphere Publishers; (1988).
5. Eastop TD, Croft DR, Energy Efficiency for Engineers and Technologists; Longman and Scientific and Technical (1988).

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Quality & Reliability Engineering
Course Code: ME 801D
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The course is designed to cover the following subjects: **Introduction and Process Control for Variables, Process Control for Attributes, Acceptance Sampling, Life Testing – Reliability, Quality and Reliability.**

Objectives:

1. To introduce the concept of SQC
2. To understand process control and acceptance sampling procedure and their application.
3. To learn the concept of reliability.

Learning Outcomes:

Upon successful completion of this course, the students can able to apply the concept of SQC in process control for reliable component production

Application:

To expose the students to the various quality control techniques and also to understand the importance and concept of reliability and maintainability in industries

Course Contents:

UNIT-I

Introduction and Process Control for Variables: Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost-Variation in process- factors - process capability - process capability studies and simple problems -Theory of control chart- uses of control chart-Control chart for variables - X chart, R chart and s chart.

UNIT-II

Process Control for Attributes: Control chart for attributes -control chart for proportion or fraction defectives - p chart and np chart - control chart for defects - C and U charts, State of control and process out of control identification in charts.

UNIT-III

Acceptance Sampling: Lot by lot sampling - types - probability of acceptance in single, double, multiple sampling techniques-O.C. curves - producer's Risk and consumer's Risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

UNIT-IV

Life Testing - Reliability: Life testing - Objective - failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate, system reliability, series, parallel and mixed configuration - simple problems. Maintainability and availability- simple problems. Acceptance sampling based on reliability test - O.C Curves.

UNIT-V

Quality and Reliability: Reliability improvements -techniques- use of Pareto analysis - design for reliability - redundancy unit and standby redundancy - Optimization in reliability - Product design - Product analysis - Product development - Product life cycles.

TEXT BOOKS:

1. Douglas.C. Montgomery, " Introduction to Statistical quality control", 4th edition, John Wiley 2001.
2. Srinath. L.S., "Reliability Engineering", Affiliated East west press, 1991.

REFERENCES:

1. John.S. Oakland. "Statistical process control", 5th edition, Elsevier, 2005
2. Connor, P.D.T.O., "Practical Reliability Engineering", John Wiley, 1993
3. Grant, Eugene .L "Statistical Quality Control", McGraw-Hill, 1996
4. Monohar Mahajan, "Statistical Quality Control", Dhanpat Rai & Sons, 2001.
5.. Gupta. R.C, "Statistical Quality control", Khanna Publishers, 1997.
6. Besterfield D.H., "Quality Control", Prentice Hall, 1993.
7. Sharma S.C., "Inspection Quality Control and Reliability", Khanna Publishers, 1998.
8. Danny Samson, "Manufacturing & Operations Strategy", Prentice Hall, 1991

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: CAD/CAM
Course Code: ME801A
L-T Scheme: 3L **Course Credits: 3**

Introduction:

To teach the theory and tools of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) with an emphasis on the central role of the geometric model in their seamless integration and a focus on the integration of these tools and the automation of the product development cycle. To introduce geometric modeling techniques and solid modeling data structure design and algorithms for its manipulation. To cover machining theory, automated CNC machining, and process control.

Objectives:

1. Understand the basic fundamentals of computer aided design and manufacturing.
2. To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc.
3. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication.
4. To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control.
5. To learn the overall configuration and elements of computer integrated manufacturing systems.

Learning Outcomes:

At the end of the course the students shall be able to:

1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique transformation of geometric entities using transformation matrix.
2. Describe the use of GT and CAPP for the product development.
3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.

Course Contents:

UNIT – I [3]
Computers in industrial manufacturing, CAD / CAM Hardware, basic structure,
CPU, memory types, input devices, display devices, hard copy devices, storage devices.

UNIT – II [4]
Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – III [6]
Geometric Modeling: Requirements, geometric models, geometric construction
Models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT – IV [7]
Drafting And Modeling Systems: Basic geometric commands, layers, display
Control commands, editing, dimensioning, and solid modeling.

Group Technology: Part family, coding and classification, types and advantages.
Computer aided processes planning – importance, types

UNIT – V [6]

Part Programming For Nc Machines: NC, NC modes, NC elements, CNC machine tools, structure of CNC machine tools, features of machining center, turning center,
CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT – VI [7]

Computer Integrated Manufacturing Systems: Types of manufacturing systems, machine tools and related equipment, material handling systems, computer control systems, human labor in manufacturing systems, CIMS benefits.

Text Books

1. P.N. Rao, CAD/CAM, Tata McGraw Hill Publication.
2. I. Zeid, CAD/CAM - Theory and Practice, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

References

1. P.N. Rao, N.K. Tewari and T.K. Kundra, Computer Aided Manufacturing, Tata McGraw-Hill Publication.
2. M.P. Groover and E.W. Zimmers Jr., CAD/CAM, Prentice Hall of India

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Industrial Robotics **Course Code: ME 801B**
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

Today's industrial assembly line is equipped with robots and man vs. machine interface has been replaced by automation. Most of the machines including our automobiles are available with variety of models and controls. We see luxury cars around us and simply dream of having one. These luxury cars offer varied and many features including safety (central lock, parking assistance, air bags etc.), economy (at times) and comfort as per buyer's criteria. It is therefore need of the day for students to learn Robotics and Auto- electronics shortened as autotronics for working in industry. This course therefore attempt to build required skills of this field in students. Further in order to tune up with growth engine of Gujarat i.e. automobile sector this course has become inevitable

Objectives:

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

Maintain various Robotic controls and Autotronics features

.

Learning Outcomes:

The theory should be taught and practical should be undertaken in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domains to demonstrate the following course outcomes:

i. Identify a Robot for a specific application.

ii. Interface various Servo and hardware components with Controller based projects.

iii. Identify parameters required to be controlled in a Robot.

iv. Develop small automatic / autotronics applications with the help of Robotics.

v. Test the robotics circuit.

Course Contents:

UNIT-I

Introduction: Brief history of robotics; definition of robot; Main components of robot: manipulator, sensors, controller, powerconversion unit; Robot geometry: types of joints, workspace, number of degrees of freedom; Common configurations used in arms: rectangular, cylindrical, spherical, joined; Classification of robot according to coordinate system: cartesian, cylindrical, polar, articulated or jointed; Classification of robots according to control method: non-servo, servo; Robot specifications: payload, accuracy, repeatability resolution, maximum tip speed, reach stroke:

UNIT-II

Robot End Effector End effector: definition, gripper, tools; Gripper : main parts, source of power; Types of grippers: mechanical grippers, vacuum cups, magnetic grippers, adhesive grippers, Hooks, scoops, ladles, universal gripper; Robot Tools: Spot welding gun, pneumatic impact wrench, pneumatic nut runner, inert gas welding torch, heating torch, grinder, spray painting gun.

UNIT-III

Robot Actuators: Definition; Characteristics: power to weight ratio, stiffness, compliance, reduction gears; Conventional actuators: hydraulic actuator, pneumatic actuator, electric motor, direct drive motor, stepper motor, servo motor; Special actuators: magnetostrictive, shape memory alloy, elastomer.

UNIT-IV

Robot Sensors: Definition; of Sensor and transducer; Calibration; Basic categories of measuring devices: analog, discrete; Main types of sensors: position, velocity, acceleration, force and pressure, torque, slip and tactile, proximity. Definition of digital image, generation of digital image; Robot Vision System: definition, use, functions, components, classification; vision cameras; Techniques of image processing and analysis: Image data reduction, segmentation, feature extraction, object recognition; Application of robot vision system.

UNIT-V

Robot Kinematics: Definition of Robot kinematics, Tool frame and base frame. Word – coordinate system, Direct kinematics, Inverse kinematics, Describing position and orientation of an object in space, Homogenous transformation, Translational transformations, Rotational transformations, Denavit- Hartenberg representation.

UNIT-VI

Robot Programming :Definition of robot programming; Different methods of robot programming: teach-pendant programming, key board programming; Programming languages: VAL II, AML/2, ARM BASIC

UNIT-VII

Industrial Applications of Robots Welding, Spray painting, Grinding;Material Transfer: machine loading and unloading, Processing operation; Assembly operation; Inspection. Special applications: underwater prospecting and repairs, Mining, Space Exploration, Surgery.

TEXT BOOKS:

1. Klafter, Richard D. Chmielewski, Thomas A. and Negin, Michael (2001) - Robotic Engineering:An Integrated
Approach, Prentice-Hall of India Pvt. Limited.
2. Mikell P. Groover, Mitchell.Weiss, Roger N. Nagel, Nicholas G. Odrey, Industrial Robotics: Technology,
Programming and Applications, McGraw-Hill International Edition

.**REFERENCES**:

3. S.R. Deb, Robotics Technology and Flexible Automation, Tata McGraw-Hill Publication.
4. S.K. Saha, Introduction to Robotics, The McGraw-Hill Publication
5. Niku, Saeed B., Introduction to Robotics Analysis, Systems, Applications, Prentice Hall of India Private Limited, New Delhi
6. Koren, Yoram, Robotics for Engineers, McGraw-Hill Book Company, Singapore
7. Hegde, Ganesh S., A Textbook on Industrial Robotics, Laxmi Publications (P) Ltd

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Automation & Control
Course Code: ME 802B
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The course is designed to cover the following subjects **Introduction to control system, Mathematical modeling of dynamic systems, Control system components, Time domain analysis, Error Analysis, State variable Analysis, Stability Analysis using root locus, Frequency domain analysis of linear system, Control System performance measure.**

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Objectives:

- To study the various parts of robots and fields of robotics.
- To study the various kinematics and inverse kinematics of robots.
- To study the Euler, Lagrangian formulation of Robot dynamics.
- To study the trajectory planning for robot.
- To study the control of robots for some specific applications

Learning Outcomes:

Upon completion of the course, the student should be able to:

1. Explain the basic concepts of working of robot
2. Analyze the function of sensors in the robot
3. Write program to use a robot for a typical application
4. Use Robots in different applications

Application:

Gain the advanced knowledge necessary to devise innovative solutions and systems in the broad field of automation and control.

Using specialist equipment in our dedicated laboratories, you'll learn to use Programmable Logic Controllers (PLCs) and Supervisory Control and Data Acquisition (SCADA) systems, the industry standard for the development of effective control systems.

Course Contents:

UNIT I

Introduction to control system: Concept of feedback and Automatic control, Effects of feedback, Objectives of control system, Definition of linear and nonlinear systems, Elementary concepts of sensitivity and robustness. Types of control systems, Servomechanisms and regulators, examples of feedback control systems. Transfer function concept. Pole and Zeroes of a transfer function. Properties of Transfer function.

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Course Description

Mathematical modeling of dynamic systems: Translational systems, Rotational systems, Mechanical coupling, Liquid level systems, Electrical analogy of Spring–Mass-Dashpot system. Block diagram representation of control systems. Block diagram algebra. Signal flow graph. Mason's gain formula.
Control system components: Potentiometer, Synchros, Resolvers, Position encoders

.UNIT II

Time domain analysis: Time domain analysis of a standard second order closed loop system. Concept of undamped natural frequency, damping, overshoot, rise time and settling time. Dependence of time domain performance parameters on natural frequency and damping ratio. Step and Impulse response of first and second order systems. Effects of Pole and Zeros on transient response. Stability by pole location. Routh-Hurwitz criteria and applications.
Error Analysis: Steady state errors in control systems due to step, ramp and parabolic inputs. Concepts of system types and error constants.

UNIT III

State variable Analysis:
State variable model of Linear Time-invariant system, properties of the State transition matrix, State transition equation, Definition of transfer function & Characteristic equation, definition of controllability and observability.

UNIT IV

Stability Analysis using root locus:
Importance of Root locus techniques, construction of Root Loci for simple systems. Effects of gain on the movement of Pole and Zeros.
Frequency domain analysis of linear system: Bode plots, Polar plots, Nichols chart, Concept of resonance frequency of peak magnification. Nyquist criteria, measure of relative stability, phase and gain margin. Determination of margins in Bode plot. Nichols chart. Mcircle and M-Contours in Nichols chart.

UNIT V

Control System performance measure: Improvement of system performance through compensation. Lead, Lag and Lead- lag compensation, PI, PD and PID control.

TEXT BOOKS:

1. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., "Industrial Robotics", Mc Graw-Hill Singapore, 1996.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.

REFERENCES:

1. Deb. S.R.,"Robotics Technology and flexible Automation", John Wiley, USA 1992.
2. Klafter R.D., Chimielewski T.A., Negin M., "Robotic Engineering – An integrated approach", Prentice Hall of India, New Delhi, 1994.
3. Mc Kerrow P.J. "Introduction to Robotics", Addison Wesley, USA, 1991.
4. Issac Asimov "Robot", Ballantine Books, New York, 1986.

5. Barry Leatham – Jones, “Elements of industrial Robotics” PITMAN Publishing, 1987.
6. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, “Industrial Robotics Technology, Programming and Applications “, McGraw Hill Book Company 1986.
7. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., “Robotics Control Sensing, Vision and Intelligence” McGraw Hill International Editions, 1987.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Water Resource Engineering
Course Code: ME802C
L-T Scheme: 3-0 **Course Credits: 3**

Introduction: This subject explores the concept of water resources engineering which broadly involves the following concepts:Causes, effects and prevention of waterlogging. Typeof drains-open drains and closed drains (introduction only), Discharge and spacing of closed drains. Examples. Lining of Irrigation Canals: Objectives, advantages and disadvantages of canal lining, economics and requirements of canal lining, Design of lined CanalsexamplesIntroduction to ground water flow, Darcy law; Wells: Definition, Types-open wellor Dug well, Tube well, open well-shallow open well, deep open well, cavity formation in open wells, construction of open wells, Yield of an open well –Equilibrium pumping test, Recuperating test, examples, Tube wells – Strainer type, cavity type, slotted type. Examples.

Objectives:
The student will have a clear understanding of the various concepts of water resources engineering. The student will understand the stream flow measurement which involves the following concepts:Direct and indirect methods, Examples. Stage discharge relationships Hydrographs; characteristics: Base flow separation. Unit Hydrographs. Derivation of unit hydrographs, S-curve, flood routing. Types of Irrigation systems, methods of irrigation: Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty &Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons. The student will also develop understanding of canal irrigation which involves Introduction, classification of irrigation canals, efficient section, certain important definitions, Time factor, Capacity factor, full supply coefficient, Nominal duty, Channel losses, Examples. Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, concept of True regime Initial regime and final regime, design procedure using Lacey's theory, examples.

Learning Outcomes:
Knowledge:
The students will develop a clear understanding of the following concepts:
Measurement of rainfall – Rain gauges, Estimation of missing rainfall data, checking of consistency, Optimum number of Rain gauges. Calculation of average rainfall over area – different methods, Frequency analysis of rainfall intensity duration curve. Rainfall mass curve, hyetograph, Examples Evaporation, evapo-transpiration and infiltration: Processes, Factors affecting run off, estimation of run-off, rainfall run off relationship. Direct and indirect methods, Examples. Stage discharge relationships, Hydrographs; characteristics: Base flow separation. Unit Hydrographs. Derivation of unit hydrographs, S-curve, flood routing. Types of Irrigation systems, methods of irrigation: Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty &Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons. Introduction, classification of irrigation canals, efficient section, certain important definitions, Time factor, Capacity factor, full supply coefficient, Nominal duty, Channel losses, Examples. Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, concept of True regime Initial regime and final regime, design procedure using Lacey's theory, examples.

Course Contents:
Unit 1: Catchment area and Hydrologic cycle, Measurement of rainfall – Rain gauges, Estimation of missing rainfall data, checking of consistency, Optimum number of Rain gauges. Calculation of average rainfall over area – different methods, Frequency analysis of rainfall intensity duration curve. Rainfall mass

curve, hyetograph, Examples Evaporation, evapo-transpiration and infiltration: Processes, Factors affecting run off, estimation of run-off, rainfall run off relationship.

Unit 2: Stream flow measurement: Direct and indirect methods, Examples. Stage discharge relationships Hydrographs; characteristics: Base flow separation. Unit Hydrographs. Derivation of unit hydrographs, S-curve, flood routing. Types of Irrigation systems, methods of irrigation: Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty &Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons.

Unit 3: Canal Irrigation: Introduction, classification of irrigation canals, efficient section, certain important definitions, Time factor, Capacity factor, full supply coefficient, Nominal duty, Channel losses, Examples.
Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, concept of True regime Initial regime and final regime, design procedure using Lacey's theory, examples.

Unit 4: Water logging and drainage: Causes, effects and prevention of water logging. Type of drains-open drains and closed drains (introduction only), Discharge and spacing of closed drains. Examples. Lining of Irrigation Canals: Objectives, advantages and disadvantages of canal lining, economics and requirements of canal lining, Design of lined Canal examples

Unit 5: Introduction to ground water flow, Darcy law; Wells: Definition, Types-open wellor Dug well, Tube well, open well-shallow open well, deep open well, cavity formation in open wells, construction of open wells, Yield of an open well –Equilibrium pumping test, Recuperating test, examples, Tube wells – Strainer type, cavity type, slotted type. Examples.

Text Books

1. Engineering Hydrology K. Subramanya Tata McGraw-Hill.
2. A Text Book of Hydrology- P. Jaya Ram Reddy Laxmi Publications-New Delhi.
3. Hydrology & Water Resource Engineering- S.K Garg Khanna Publishers.
4. Hydrology Principles, Analysis and Design H. M. Raghunath.
5. Hydraulics of Groundwater J. Bear McGraw-Hill.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Automobile Engineering
Course Code: ME 802D
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The course is designed to cover the following subjects: History & Development of Automobile, **Auto Electrical Steering System, Transmission System, Suspension System, Power Requirement, Maintenance of Vehicle., Differential & Axle.**

Objectives:

1. To understand the construction and working principle of various parts of an automobile.
2. To have the practice for assembling and dismantling of engine parts and transmission system

Learning Outcomes:

At the end of the course, the student will be able to
OUTCOMES:

1. Upon completion of this course, the students will be able to identify the different components in automobile engineering.
2. Have clear understanding on different auxiliary and transmission systems usual.

Application:

Student can build a new car after studying this subject.
It will be useful for identification of all the models of car and automobile.
Very known about the technical specification about the automobiles

Course Contents:

UNIT I

Introduction: History & Development of Automobile. various sub system of Automobile
Prime Mover: Engine for Two –Wheeler & Three- Wheeler vehicles, Engine for passenger cars, commercial and other vehicle, Fuel system for carburetted engine, MPFI engine and Diesel engine, Lubrication and cooling system.

UNIT II

Auto Electrical: Electric Motor as prime mover, Battery, generator, Ignition system, Starting system, lighting & signalling
Steering System: Devis steering & Ackerman steering system. Rack & pinion, cam & lever, worm & sector system.

UNIT III

Course Description

Transmission System: Flywheel & clutch. Gearbox sliding and constant mesh type, Automoatic Transmission, Universal joint, Propeller shaft.
Differential & Axle: Construction & function of differential, Different types of front & rear axles.

UNIT IV
Suspension System: Conventional and independent suspension system, application
Brake System: Disc & drum brake, Hydraulic brake, Parking brake. Stopping distance.

UNIT V

Power Requirement: Various resistances such as air resistance, gradient resistance, rolling resistance. Tractive effort. Torque- Speed curve. Horse power calculation.
Maintenance of Vehicle.

TEXT BOOKS:
1. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.
2. Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2002.
REFERENCES:
1. Newton ,Steeds and Garet, "Motor Vehicles", Butterworth Publishers,1989.
2. Joseph Heitner, "Automotive Mechanics," Second Edition, East-West Press, 1999.
3. Martin W, Stockel and Martin T Stockle , "Automotive Mechanics Fundamentals," The Good heart –Will Cox Company Inc, USA ,1978.
4. Heinz Heisler, "Advanced Engine Technology," SAE International Publications USA, 1998.
5. Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2007.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Design of Mechanical System lab
Course Code: ME891
L-T –P Scheme: 3P **Course Credits: 2**

Course Description & Objectives:

Lectures and projects covering problem solving methodology in the design, analysis, and synthesis of mechanical and thermal systems. The student's academic background combines with engineering principles and topics to serve as a foundation for broad engineering projects. Emphasis on creative thinking and the engineering design process in projects involving optimal conversion of resources.

Objective 1: To teach students the fundamentals of mechanical engineering design theory to design, create and select components of complete mechanical systems from the recognition of need and definition of design objectives, design innovation.

Objective 2: To illustrate to students the setting up and solving of structured and unstructured design problems, stages of design.

Objective 3: To teach students how to apply computer based techniques in the analysis, design/selection of mechanical systems and to enhance student's communication skills.

Course Outcomes:

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Contents:

In this sessional course work the students have to make design calculations and prepare component & assembly drawings/sketches (preferably in CAD) on a mechanical system assigned to a group of 4 to 5 students. Mechanical systems will include plants, equipment,instruments,

drives, mechanisms, hydraulic/pneumatic/lubrication systems etc. The teachers will allocate one suitable mechanical system appropriate for a 8th. semester Mechanical Engineering student to each group of students.The students have to carryout the design work in consultation with the respective teacher/s and submit the design work in bound volumes individually and face a viva voce examination as proof of their individual understanding of the design work.

TEXT BOOKS:

Lab Manual and Lecture Notes for ME 4053a Thermal Energy and Fluids Laboratory, The George W. Woodruff School of Mechanical Engineering. Lab Manual for ME 4053b Mechanical Systems Lab, The George W. Woodruff School of Mechanical Engineering.

REFERENCES:

Sheldon Jeter and Jeffrey Donnell, Writing Style and Standards in Undergraduate Reports, 2nd Edition, College Publishing, 2011.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Grand Viva
Course Code: ME881
L-T –P Scheme: 0P **Course Credits: 4**

Aims and Objectives

1. To compare the traditional viva examination (TVE) with OSVE (Objective Structured Viva Examination).

2. To obtain the students' opinion regarding OSVE as an assessment tool.

3. A suggestion to include OSVE as a part of university examination.

Materials and Methods

The study was carried out in November 2012, at K.J. Somaiya Medical College, in the department of Anatomy. 50 students were exposed to different stations of viva as well as OSVE. A comparison was made of the student's performance and a feedback was taken from the students regarding the same.

As the OSVE was being conducted for the first time, the students were notified in advance regarding the plan for conducting the part ending practical assessment – by both the TVE and OSVE. The OSVE was planned for 20 marks, viva voce of 20 marks.

Purpose and Format of the Viva Voce Examination

Literally, "viva voce" means by or with the living voice - i.e., by word of mouth as opposed to writing. So the viva examination is where you will give a verbal defence of your thesis.

Put simply, you should think of it as a verbal counterpart to your written thesis. Your thesis demonstrates your skill at presenting your research in writing. In the viva examination, you will demonstrate your ability to participate in academic discussion with research colleagues.

Purpose of the Exam

The purpose of the viva examination is to:

- demonstrate that the thesis is your own work
- confirm that you understand what you have written and can defend it verbally
- investigate your awareness of where your original work sits in relation to the wider research field
- establish whether the thesis is of sufficiently high standard to merit the award of the degree for which it is submitted

- allow you to clarify and develop the written thesis in response to the examiners' questions

The Examiners and Exam Chair

You will normally have two examiners:

- an internal examiner who will be a member of academic staff of the University, usually from your School/Department but not one of your supervisors
- an external examiner who will normally be a member of academic staff of another institution or occasionally a professional in another field with expertise in your area of research (candidates who are also members of University staff will normally have two external examiners in place of an internal and an external examiner)

Your supervisor should let you know who your examiners will be as it is important that you ensure you are familiar with their work and any particular approach that they may take when examining your thesis.

In some cases there may also be a Chair person for the examination. A Chair is appointed if the Graduate Dean or either of the examiners feels this is appropriate, for example where the examining team has relatively little experience of examining UK research degrees. The Chair is there to ensure the examination is conducted in line with University regulations and is not there to examine your thesis. If there is a Chair person, it will usually be a senior member of the academic staff of your School/Department.

Normally no one else is present in the exam.

Exam Venue and Arrangements

Your internal examiner is responsible for arranging your viva exam and they will contact you with the relevant details - date, time, venue, etc.

Usually the viva exam will take place in your School/Department, though occasionally another University location may be used. If you are unsure where you need to go, make sure you check this before the day of your exam.

If you returned your Notice of Intention to Submit Your Thesis three months before your submission date, your viva exam should normally take place quite soon after submission. Almost

all viva exams take place within three months of thesis submission and in many cases it is within one month.

Format of the Exam

All viva examinations are different, so it is not possible to describe exactly what will happen - but there are general points which can be made which may be helpful, and you should have the opportunity before your examination to discuss what will happen with your supervisor or to attend the University's pre-viva examination workshop.

The purpose of the viva is to establish that your work is of a sufficiently high standard to merit the award of the degree for which it is submitted. In order to be awarded a research degree, the thesis should demonstrate an original contribution to knowledge and contain work which is deemed worthy of publication.

In order to do this, examiners may:

- ask you to justify your arguments
- ask you to justify not only things which you have included in your thesis but also things which you may have left out
- ask you questions about the wider research context in which the work has been undertaken
- argue certain points with you
- expect you to discuss any developments which may flow from your work in the future

Inevitably, your thesis will have strengths and weaknesses and the examiners will want to discuss these. It is considered a positive thing, indeed an essential thing, that you can discuss both the strengths and the weaknesses. You can think of the weaknesses as an opportunity to demonstrate your skill at critical appraisal.

Remember that examiners seek to find and discuss weaknesses in all theses - you should not interpret criticism as an indication that the examination will not end successfully.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Project Part- II Lab
Course Code: ME882
L-T –P Scheme: 12P **Course Credits: 6**

Project: an activity where the participants have some degree of *choice* in the outcome. The result is complete and functional, that is, it has a beginning, middle and end. Usually, it spans multiple lab periods and requires work outside scheduled lab periods. Since there are choices in implementation, *design* is inherently a component of a project. A project is inherently different from an *analysis* or *exercise*, in which the solution has a predictable form. Projects span a wide variety of possibilities: design and build, identify a system, do a forensic analysis, evaluate a product or assess some environmental situation.

Program Objective 1
Graduates shall make their way to the society with proper scientific and technical knowledge in mechanical engineering.

Program Objective 2
Graduates shall work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis.

Program Objective 3
Graduates shall adapt to the rapidly changing environment in the areas of mechanical engineering and scale new heights in their profession through lifelong learning.

Program Objective 4
Graduates shall excel in career by their ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

Program Outcomes:

1. Ability to apply knowledge of mathematics, science and mechanical engineering fundamentals for solving problems.
2. Ability to Identify, formulate and analyze mechanical engineering problems arriving at meaningful conclusions involving mathematical inferences.
3. Ability to design and develop mechanical components and processes to meet desired needs considering public health, safety, cultural, social, and environmental aspects.
4. Ability to understand and investigate complex mechanical engineering problems experimentally.
5. Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.
6. Ability to understand the effect of mechanical engineering solutions on legal, cultural, social, public health and safety aspects./li>

7. Ability to develop sustainable solutions and understand their impact on society and environment.
8. Ability to apply ethical principles to engineering practices and professional responsibilities.
9. Ability to function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10. Ability to comprehend, design documentation, write effective reports, make effective presentations to the engineering community and society at large.
11. Ability to apply knowledge of engineering and management principles to lead teams and manage projects in multidisciplinary environments.
12. Ability to engage in independent and life-long learning in the broad context of technological changes and advancements.