7TH SEMESTER

DEPARTMENTAL ELECTIVE

TOTAL QUALITY MANAGEMENT (TQM)

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UNIT -I:

Quality Concepts:

Evolution of Quality control, concept change, TQM Modern concept, Quality concept in design.

Control on Purchased Product:

Procurement of various products, evaluation of supplies, capacity verification, Development ofsources, procurement procedure.

Manufacturing Quality:

Methods and Techniques for manufacture, Inspection and control of product, Quality in sales andservices, Guarantee, analysis of claims.

UNIT -II:

Quality Management:Organization structure and design, Quality function, decentralization, Designing and fittingorganization for different types products and company, Economics of quality value andcontribution, Quality cost, optimizing quality cost, seduction programme.

TQM Principles:Leadership, strategic quality planning; Quality councils- employeeinvolvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognitionand reward, performance appraisal; Continuous process improvement; PDCE cycle, 5S,Kaizen; Supplier partnership, Partnering, Supplier rating & selection.

UNIT -III:

Tools and Techniques:

Seven QC tools (Histogram, Check sheet, Ishikawa diagram, Pareto, Scatter diagram, Controlchart, flow chart).

Control Charts:

Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts, P-charts and C-charts.

UNIT -IV:

Defects Diagnosis and Prevention:

Defect study, identification and analysis of defects, corrective measure, factors affectingreliability, MTTF, calculation of reliability, Building reliability in the product, evaluation ofreliability, interpretation of test results, reliability control, maintainability, zero defects, qualitycircle.

UNIT -V:

IS0and its concept of Quality Management:

Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements,documentation, Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits;TQM implementation in manufacturing and service sectors, Auditing,Taguchi method, JIT in some details.

Books and References:

1. Total Quality Management, by Dale H. Besterfield, Pearson India.
2. Beyond Total Quality Management, Greg Bounds, McGraw Hill.

3. Besterfield D.H. et al., Total qualityManagement, 3rd ed., Pearson Education Asia, 2006.

4. Evans J.R. and Lindsay W.M., The management and Control of Quality, 8th ed., firstIndian edition, Cengage Learning, 2012.

5. Janakiraman B. and Gopal R.K., Total Quality Management, Prentice Hall India, 2006.

6. Suganthi L. and Samuel A., Total Quality Management, Prentice Hall India, 2006.
7. Total Quality Management by Mukherjee, P.N.
4. TQM in New Product manufacturing, H. G. Menon, McGraw Hill

CAD/CAM

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UNIT-I:

Principles of Computer Graphics:Point plotting, drawing of lines, Bresenham's circle algorithm.

Transformation in Graphics:Co-ordinate system used in Graphics and windowing, view port, views.

2D transformations – rotation, scaling, translation, mirror, reflection, shear - homogeneous transformations – concatenation.

3D Transformation – Perspective Projection – Technique (Description of techniques only).

Geometric Modelling:

Classification of Geometric Modelling – Wire frame, Surface and Solid Modelling, applications – representation of curves and surfaces – Parametric form.

Design of curved shapes- Cubic spline – Bezier curve – B-spline – Design of Surfaces - features of Surface Modelling Package – Solid Primitives, CSG.

B-rep and description of other modelling techniques like Pure primitive instancing, cell decomposition, spatial occupancy enumeration, Boolean Operations (join, cut, intersection), Creating 3D objects from 2D profiles (extrusion, revolving etc).

UNIT-II:

Graphics standard & Data storage:

Standards for computer graphics GKS, PHIGS. Data exchange standards – IGES, STEP - Manipulation of the model - Model storage.

Finite Element Modelling:

Introduction, Mesh Generation – mesh requirements. Semi-Automatic Methods- Node-based approach, Region based approach, Solid-modelling-based methods.

Fully Automatic Methods- Element-based approach, Application, Mesh Refinements using Isoperimetric Finite Elements, Meshing in high gradient areas, Transition Regions. Sub modelling Concept.

An overview of modelling software's like PRO-E, CATIA, IDEAS, SOLID EDGE etc.

UNIT-III:

CAM:

Scope and applications – NC in CAM – Principal types of CNC machine tools and their construction features – tooling for CNC – ISO designation for tooling – CNC operating system – FANUC, SINUMERIK – LINUMERIK.

Programming for CNC machining – coordinate systems – manual part programming – computer assisted part programming – CNC part programming with CAD system.

Material handling in CAM environment:

Types – AGVS – AS/RS – Swarf handling and disposal of wastes – single and mixed mode assembly lines – quantitative analysis of assembly systems.

UNIT-IV:

Robotics:

Classification and specification – drive and controls – sensors - end effectors - grippers- tool handling and work handling – machine vision – robot programming concepts – case studies in assembly.

Quality Function Deployment:

Process Planning – CAPP – Variant and Generative systems- Concurrent Engineering and Design for Manufacturing.

Advanced manufacturing Planning Computer Aided Production Planning and Control – Aggregate production planning and master production schedule – MRP – MRP II – ERP - Capacity planning.

UNIT-V:

Rapid prototyping:

Need for rapid prototyping, Basic principles and advantages of RP, General features and classifications of different RP techniques with examples.

Introduction to three representative RP techniques: Fusion Deposition Modelling, Laminated Object Manufacturing and Stereo-lithography.

Flexible manufacturing cells:

Systems – characteristics – economics and technological justification – planning, installation, operation and evaluation issues – role of group technology and JIT in FMS – typical case studies future prospects.

Books and References:

1. Chris Mcmahon and - CAD/CAM – Principle Practice and Manufacturing Management,Jimmie Browne Addision Wesley England, Second Edition,2000.

2. Dr.Sadhu Singh - Computer Aided Design and Manufacturing, Khanna Publishers, NewDelhi, Second Edition,2000.

3. P.Radhakrishnan, - CAD/CAM/CIM, New Age International (P) Ltd., New Delhi.S.Subramanayanand V.Raju.

4. Groover M.P. and - CAD/CAM; Computer Aided Design and Manufacturing, Prentice HallZimmers EW. International, New Delhi, 1992.

5. Ibrahim Zeid - CAD/CAM theory and Practice, Tata McGraw Hill Publishing Co. Ltd.,Company Ltd., New Delhi, 1992.

6. Mikell P.Groover - Automation , Production Systems and Computer IntegratedManufacturing, Second edition, Prentice Hall of India, 2002.

7. S.Kant Vajpayee - Principles of Computer Integrated Manufacturing, Prentice Hall ofIndia, 1999.

8. David Bed worth - Computer Integrated Design and Manufacturing, TMH, 1998.

CAD/CAM LAB

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List of Experiments: (Total EIGHT Experiments are to carried out. FOUR Experiments each from CAD and CAM.)

A. CAD Experiments:

1. Line Drawing or Circle Drawing experiment: Writing and validation of computer program.

2. Geometric Transformation algorithm experiment for translation/rotation/scaling: Writing and validation of computer program.

3. Design of machine component or other system experiment: Writing and validation of computer program.
4. Understanding and use of any 3-D Modelling Software commands.
5. Pro/E/Idea etc. Experiment: Solid modelling of a machine component.

6. Writing a small program for FEM for 2 spring system and validation of program or using a FEM Package.

7. Root findings or curve fitting experiment: Writing and validation of computer program.

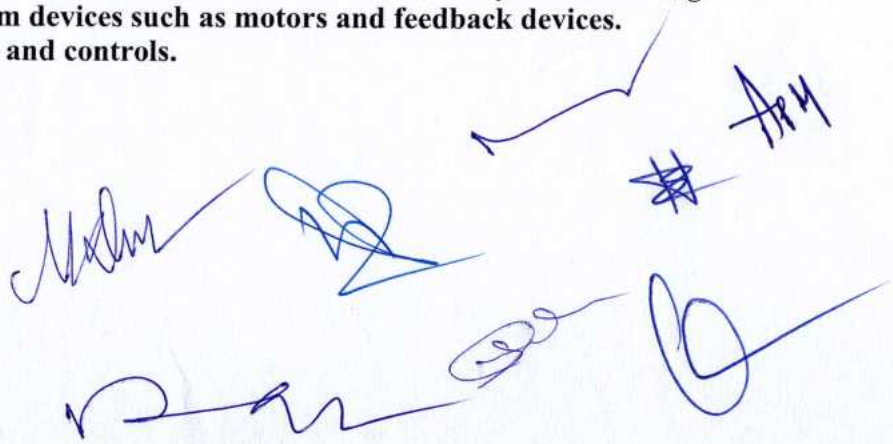
8. Numerical differentiation or numerical integration experiment: Writing and validation of computer program.

B. CAM Experiments:

1. To study the characteristic features of CNC machine.

2. Part Programming (in word address format) experiment for turning operation (including operations such as grooving and threading) and running on CNC machine.
3. Part Programming (in word address format or ATP) experiment for drilling operation (point to point) and running on CNC machine.

4. Part Programming (in word address format or ATP) experiment for milling operation (contouring) and running on CNC machine.
5. Experiment on Robot and programs.
6. Experiment on Transfer line/Material handling.
7. Experiment on difference between ordinary and NC machine, study or retrofitting.
8. Experiment on study of system devices such as motors and feedback devices.
9. Experiment on Mechatronics and controls.



POWER PLANT ENGINEERING

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UNIT-I:

Introduction:

Power and energy, sources of energy, review of thermodynamic cycles related to power plants,fuels and combustion calculations.Load estimation, load curves, various terms and factors involved in power plant calculations.

Effect of variable load on power plant operation, Selection of power plant units.Power plant economics and selectionEffect of plant type on costs, rates, fixed elements, energy elements, customer elements andinvestor's profit; depreciation and replacement, theory of rates. Economics of plant selection,other considerations in plant selection.

UNIT-II:

Steam power plant:

General layout of steam power plant, Power plant boilers including critical and super criticalboilers. Fluidized bed boilers, boilers mountings and accessories, Different systems such as coalhandling system, pulverisers and coal burners, combustion system, draft, ash handling system,Dust collection system, Feed water treatment and condenser and cooling towers and coolingponds, Turbine auxiliary systems such as governing, feed heating, reheating, flange heating andgland leakage. Operation and maintenance of steam power plant, heat balance and efficiency,Site selection of a steam power plant.

UNIT-III:

Diesel power plant:

General layout, Components of Diesel power plant, Performance of diesel power plant, fuelsystem, lubrication system, air intake and admission system, supercharging system, exhaustsystem, diesel plant operation and efficiency, heat balance, Site selection of diesel power plant,Comparative study of diesel power plant with steam power plant.

Gas turbine power plant:

Layout of gas turbine power plant, Elements of gas turbine power plants, Gas turbine fuels,cogeneration, auxiliary systems such as fuel, controls and lubrication, operation andmaintenance, Combined cycle power plants, Site selection of gas turbine power plant, Integrated Gasifierbased Combined Cycle (IGCC) systems.

UNIT-IV:

Nuclear power plant:

Layout and subsystems of nuclear power plants, BoilingWater Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, PressurizedHeavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metalcooled reactors, safety measures for nuclear power plants.

Hydroelectric and Non-Conventional Power Plant:Hydroelectric power plants, classification, typical layout and components, principles of wind,tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

UNIT-V

Electrical system:

Generators and generator cooling, transformers and their cooling, bus bar, etc.

Energy Saving and Control:

Energy, economic and environmental issues, power tariffs, load distribution parameters, loadcurve, capital and operating cost of different power plants, pollution control technologiesincluding waste disposal options for coal and nuclear plants.

Books and References:

1. **Power Plant Engineering, by F.T. Morse, Affiliated East-West Press Pvt. Ltd.**
2. **Power Plant Engineering by Hedge, Pearson India.**
3. **Power Plant Technology, by Wakil, McGraw Hill.**
4. **Power Plant Engineering by P.K. Nag, Tata McGraw Hill.**
5. **Steam & Gas Turbines & Power Plant Engineering by R.Yadav, Central Pub.House.**
6. **Power Plant Engineering by Gupta, PHI India.**
7. **El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.**
8. **Power Plant Engineering. Mahesh Verma, Metropolitan Book Company Pvt. Ltd.**

AUTOMOBILE ENGINEERING

L-T-P

3-2-0

UNIT-I:

Introduction:Basic concepts of Automobile Engineering and general configuration of an automobile, Powerand Torque characteristics. Rolling, air and gradient resistance. Tractive effort. Gear Box. Gearratio determination.

UNIT-II:

Transmission System:Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint.Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle.Castor Angle, wheel camber

& Toe-in, Toe-out etc... Steering geometry. Ackerman mechanism,Understeer and Oversteer. Hotchkiss drive and Torque tube drive.

UNIT-III:

Braking System:General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes,Hydraulic brakes. Vacuum and air brakes. Thermal aspects.Antilock braking system(ABS), electronic brake force distribution (EBD) and traction control.

Chassis and Suspension System:Loads on the frame, Strength and stiffness, Independent front & rear suspension, Perpendiculararm type, Parallel arm type, Dead axle suspension system, Live axis suspension system,Airsuspension & shock absorbers.

UNIT-IV:

Electrical System:Types of starting motors, generator & regulators, lighting system, Ignition system, Horn, Batteryetc.

Fuel Supply System:Diesel &Petrol vehicle system such as Fuel Injection Pump, Injector & Fuel Pump, Carburettoretc.MPFI.

UNIT-V:

Emission standards and pollution control:Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel qualitystandards, environmental management systems for automotive vehicles, engine emissioncontrol by 3-way catalytic converter system, fueladditives and modern trends in automotive engine efficiency and emission control.

Alternative Energy Sources:

Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogenfuels in automobiles, modifications needed, performance, combustion & emissioncharacteristics of alternative fuels in SI and CI engines, Electric and Hybrid vehicles,application of Fuel Cells. Prevention maintenance and overhauling.

Books and References:

1. **Automotive Engineering- Hietner.**
2. **Automobile Engineering - Narang.**
3. **Automobile Engineering –TTTI, Pearson India.**
4. **Automotive Mechanics- Crouse.**

I.C. ENGINES & AUTOMOBILE LAB

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Experiments: Say at least 8 experiments out of following in depth and details.

1. **Performance Analysis of Four stroke S.I. Engine- Determination of indicated and brake thermal efficiency, specific fuel consumption at different loads, Energy Balance.**
2. **Determination of Indicated H.P. of I.C. Engine by Morse Test.**
3. **Performance Analysis of Four stroke C.I. Engine- Determination of indicated and brake thermal efficiency, specific fuel consumption at different loads, Energy Balance.**
4. **Study & experiment on Valve mechanism.**
5. **Study & experiment on Gear Box.**
6. **Study & experiment on Differential Gear Mechanism of Rear Axle.**
7. **Study & experiment on Steering Mechanism.**
8. **Study & experiment on Automobile Braking System.**
9. **Study & experiment on Chassis and Suspension System.**
10. **Study & experiment on Ignition system of I.C. Engine.**
11. **Study & experiment on Fuel Supply System of S.I. Engines- Carburettor, Fuel Injection Pump and MPFI.**
12. **Study & experiment on Fuel Supply System of C.I. Engines- Injector & Fuel Pump.**
13. **Study & experiment on Air Conditioning System of an Automobile.**
14. **Comparative study of technical specifications of common small cars (such as Maruti Swift, Hyundai i20, Chevrolet Aveo, Tata Indica, Ford Fusion etc.**
15. **Comparative study & technical features of common scooters & motorcycles available in India.**
16. **Visit of an Automobile factory.**
17. **Visit to a Modern Automobile Workshop.**
18. **Experiment on Engine Tuning.**
19. **Experiment on Exhaust Gas Analysis of an I.C. Engine.**