**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**Industrial Production Engineering, VII-Semester**

**IP 701- CIM and Automation**

1. Fundamentals of Manufacturing and automation and production economics: Manufacturing industries, Types of production, Functions in Manufacturing, Organization & information processing in Manufacturing, Plant layout, Production concepts and mathematical models automation strategies. Methods of evaluating investment alternatives, Costs in manufacturing, Break even analysis, unit cost of production, Cost of manufacturing, Lead time, Work in process, Difficult to quantity factors.

2. High volume production systems: Automated flow lines, Methods of work part transport, Transfer mechanism, Buffer storage, Control functions, Automation for machining operations design & fabrication consideration. Analysis of transfer lines, Partial automation, Automated flow lines with storage buffers, Computer simulation of automated flow lines.

3. Numerical Control : Concepts and Types, Position and motion control, Constructional features of NC machines, CNC, DNC and Machine Center, Adaptive Control. Programming of CNC Machines MIRAC and TRIAC. Machine axis definition, Programming words EIA codes. CNC canned cycles G71, G72, G73, G74, G90, G92, G94 for CNC lathe. Absolute and Incremental Programming. Canned cycles of CNC milling machine.

4. Computer assisted Part Programming, APT, The APT System, Continuous Path Part Programming, Geometry Statements, Part Programming and Debugging, Computations APT : Decisions and Looping, Subscripted Variables, Macro Definitions, Characteristics and Limitations of Macro. Introduction to Multi-axis Programming. Pocket machining methods, Surface Machining methods. Automated Part Program generation .

5. Computers Integrated Manufacturing Definition, CIM wheel concept, Evolution of CIM, CIM and systems view of manufacturing, and CIM IT & concurrent engineering, Economic Impact of CIM and Scale Dynamics. Rapid Prototyping Technologies : Sterelithography, Selective Photocuring, Selective sintering, Fused Deposition Modeling, Laminated Object Manufacturing, 3D Printing, Applications of RP techniques, Emerging Techniques in RP, RP Methodology, Rapid Tooling. Process capability of RP and RT methods. Types of coordinate measuring machine, Components of CMM, Application Software of CMM, Accuracy of CMM, linear, volumetric and system probing error, Error measurement and Correction. Calibration of CMM

**Books & References Recommended :**


1. Automation, Production systems and CIM, by Mikell P Groover, Pearson Prentice Hall Singapore
2. CAD/CAM Principles & Applications, By P N Rao, Tata McGraw-Hill Publishing Company.
3. Computer Aided Manufacturing, by Tien-chien Chang, Richard Wysk& Hsu-Pin Wang, PHI India

4. Fundamentals of CAD/CAM/CIM, by Vikram Sharma, S K Kataria& Sons New Delhi
5. Zeid, CAD/CAM Theory & Practice, McGraw-Hill
6. Numerical Control Programming in APT Irvin H Kral Prentice Hall
7. CNC Programming Manual TRIAC
8. CNC Programming Manual MIRAC

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**Industrial Production Engineering, VII-Semester**

**Departmental Elective IP- 702 (A) Production Management**

**Theory :**

1. Production Management : Introduction, Systems Concept, Difference between Production & Operations management, Decisions, Organization, Objectives, and Historical review, Types of production system,
2. Facility Planning : Plant Location, Plant Layout Analysis & Evaluation, Material Handling equipments and facility design Procedures such as CORELAP, CRAFT etc.

   PPC Functions, Organization, Make or Buy decision, Forecasting methods.
3. Aggregate Planning : Introduction, Strategies of Aggregate Planning, Graphic and Charting methods, Transportation and HMMS method, Master Production Scheduling.

   Scheduling and Sequencing : Factors affecting scheduling and its approaches, Grantt Chart, Algorithms for jobshop and flow shop, Line Balancing, LOB.
4. Materials Management : Objectives, Organization, Functions. Purchasing: Principles, Methods, Procedure. Stores Management: Functions, Location of Stores. Inventory Models, Systems, and Selective Inventory Control and Just – In – Time system of manufacturing, Material Requirement Planning and Capacity Requirements Planning, Introduction to MRP II.
5. Maintenance Management : Types of maintenance strategies, Breakdown and Preventive Maintenance, Predictive and Total Productive Maintenance, Condition monitoring, Individual and Group replacement policies.

**Books Recommended:**


1. Chase AcquilinoJackobs, Operations Management, McGraw Hill.
2. Charry S. N., Production and Operation Management, McGraw Hill.
3. Adam Ebert, Production and Operation Management, PHI.
4. Eilon S., Production Planning and Control, McMillan Pub. .
5. A.K. Chitale and R.C. Gupta, Materials Management, PHI
6. G. K. Agrawal, Plant Layout and Material Handling, Jain Pub.


**References Recommended:**


1. Gaither Norman, Operations Management,
2. Dillworth James, Operations Management, McGraw Hill.
3. RitzmanKrajwaski, Operations Management, McGraw Hill.

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**Industrial Production Engineering, VII-Semester**

**Departmental Elective IP- 702 (B) Automobile Engineering**

## COURSE CONTENTS

**UNIT 1** Vehicle Structure: Fine frame, integral body structure, engine, transmission and body structure mountings, sub-frames collision safety, type of rubber flexible mounting. Vehicle ride characteristics: human response, vehicle ride.

Handling System and Steering System: Study state handling characteristics and response to input Steering gear box fundamental design. Need for power steering, steering linkages ball and socket joints.

Suspension: Suspension geometry camber, Swivel & Castor angle. Suspension roll centres body roll stability. Antiroll stiffness. Rubber Spring pump or limiting stop. Axle location, front wheel drive, independent suspension, McPherson stut& rear wheel. Hotch kiss drive springs & shock absorber.

**UNIT 2** Pneumatic Tyre: Mechanics of type forces, rolling resistance, tractive effort & step. Cornering properties 8: stiffness, Performance on roads. Tyre material & construction, Thread design & its marking identification brakes,

Braking fundamentals, Brake shoe & pad fundamentals brake 8: shoe expander & adjuster disc brakes. Dual brake system, anti locking brakes air operated power brakes.

**UNIT 3** Friction Clutch: Clutch fundamentals, Angular driven plate, Cushioning &tortional damping, Friction material, clutch alignment, types of clutch diaphragm, multiplate etc., hydraulically operated automatic transmission clutch.

**UNIT 4** Transmission: The necessity for 3 Gear box, five speed and reverse synchromesh, Gear box synchronization & engagement, remote controlled gear selection 8: engagement, splitter & range change gear box, over drive considerations setting gear ratios, Hydrokinetic fluid coupling 8t torque converter, final drive transmission, crown wheel 8: pinion axle adjustment, differential locks, skid reducing universal joint, four wheel drive & two wheel drive.

**UNIT 5** Performance Characteristics of Road Vehicles: Tractive effort weight & axle loads, aerodynamics forces, vehicle power plant & transmission characteristics & its prediction operating fuel economy. Electrical System: Self starting mechanism 8: battery charging system, Lighting & wiring system for horn, lamp indicators etc. General: Air conditioning, auto-inspection motor vehicle acts, emission standard 8: its control.

## TEXT BOOKS RECOMMENDED:

1. Wrong, Theory of ground vehicle.
2. Hinz, Advanced automobile.

## REFERENCES RECOMMENDED

1. Newton steeds Garret, The motor vehicle.
2. Crouse/ Anglin, Automotive mechanics, TMH Edition, The series of judge, The modem motor Engg.

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**Industrial Production Engineering, VII-Semester**

**Departmental Elective IP- 702 (C) Power Plant Engineering**

**Course Objectives:**

After studying this course, students will be able to

1. Understand the conversion of renewable energy system into electrical power.
2. Design & enhance the performance of fossil fuel based power plant.
3. Analyze the nuclear power plant and its safety.
4. Design & enhance the performance of hydro based power plant.
5. Determine economics of the power plant of renewable and non renewable / nuclear power system

**Syllabus:**

**Unit I: Introduction:**

Introduction to methods of converting various energy sources to electric power, direct conversion methods renewable energy sources, solar, wind, tidal, geothermal, bio-thermal, biogas and hybrid energy systems, fuel cells, thermoelectric modules, MHD-Converter

**Unit II: Fossil fuel steam stations**:

Basic principles of sitting and station design, effect of climatic factors on station and equipment design, choice of steam cycle and main equipment, recent trends in turbine and boiler sizes and steam conditions, plant design and layout, outdoor and indoor plant, system components, fuel handling, burning systems, element of feed water treatment plant, condensing plant and circulating water systems, cooling towers, turbine room and auxiliary plant equipment., instrumentation, testing and plant heat balance.

**Unit III**: **Nuclear Power Station**:

Importance of nuclear power development in the world and Indian context, Review of atomic structure and radio activity, binding energy concept, fission and fusion reaction, fissionable and fertile materials, thermal neutron fission, important nuclear fuels, moderators and coolants, their relative merits, thermal and fast breeder reactors, principles of reactor control, safety and reliability features.

**Unit IV: Hydro-Power Station**:

Elements of Hydrological computations, rainfall run off, flow and power duration curves, mass curves, storage capacity, salient features of various types of hydro stations, component such as dams, spillways, intake systems, head works, pressure tunnels, penstocks, reservoir, balancing reservoirs, Micro and pico hydro machines, selection of hydraulic turbines for power stations, selection of site.

**Unit V: Power Station Economics**:

Estimation and prediction of load. Maximum demand, load factor, diversity factor, plant factor and their influence on plant design, operation and economics; comparison of hydro and nuclear power plants typical cost structures, simple problems on cost analysis, economic performance and tariffs, interconnected system and their advantages, elements of load dispatch in interconnected systems.

**References:**


1- Nag PK; Power plant Engg; TMH
2- Al-Wakil MM; Power plant Technology; TMH
3- Sharma PC; Power plant Engg; Kataria and sons, Delhi
4- Domkundwar; Power Plant Engg; Dhanpatrai & sons.
5- Rajput RK; A text book of Power plant Engg.; Laxmi Publications.


**Evaluation**

Evaluation will be continuous an integral part of the class as well through external assessment.

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**Industrial Production Engineering, VII-Semester**

**Open Elective IP- 703 (A) Project & Financial Management**

**COURSE CONTENTS:**

1. **Project management and feasibility:** Introduction to projects. Characteristics and types of projects. Gaining importance, Project selection, technical feasibility and technology selection, market feasibility. Social Cost Benefit Analysis, project manager's skills and functions
2. **Project Monitoring and Control:** Network analysis, construction of networks, CPM, various types of floats and their application, PERT and its applications. Time cost relationship, crashing for optimum cost and optimum time. Resource leveling. Earned Value Analysis,
3. **Feasibility and Risk Analysis:** Time value of money, DCF and Non DCF Methods for Evaluating Projects. Types of risk, techniques of risk evaluation and its mitigation. Sensitivity analysis, Hiller's model, scenario analysis, simulation with numerical aspects
4. **Financial Management and Analysis:** Concept, Nature, Scope, and Objective of Financial Management, Finance Functions, Sources of Finance. Liquidity, Activity, Profitability and Leverage Ratios. Interpretation of ratios
5. **Capital structuring and Working capital management:** Cost of Capital, Cost of Debt, Preference shares, Equity Shares, Weighted Average Cost of Capital. Working Capital: Concept, Need and Determinants. Computing working capital.

**Text Books:**

1. Gupta Rajeev M., "Project Management", New Delhi: PHI learning solutions, 2nd ed. 2014
2. Pandey, I.M., "Financial Management", New Delhi: Vikas Publication House, 9th Ed., 2005.
3. Khan, M.Y., Jain, P.K., "Financial Management", Delhi: Tata McGraw Hill, 5th Edition, 2008.
4. Chandra, Prasanna, "Projects, planning, analysis, selection, financing, implementation and review", New Delhi, Tata McGraw Hill, 7th Edition, 2008

**References Books :**

1. Chandra, Prasanna, "Financial Management", New Delhi, Tata McGraw Hill, 7th Edition, 2008.
2. Meredit, Mentell, "Project Management", John Willey
3. Bhalla, V. K., "Working Capital Management", 2nd Edition 1998, Anmol Publication, New Delhi, 1998.
4. Kishore, Ravi M., "Financial Management", Taxmann Publications.

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**Industrial Production Engineering, VII-Semester**

**Open Elective IP- 703 (B) Product Management**

1. Product Design : Product specifications, concept development, configuration design involving synthesis, analysis and optimization, Detailed design, Presentation of design Oral and Visual presentations, various types of models used in product design, Design through creative routes, Adaptive and variant design, Concurrent Engineering.
2. Design for manufacturing and Design for assembly, Role of Aesthetics and Ergonomics in design. Design for Environment. Robust Design using Taguchi methods, Reliability based design. Modular versus integral design.
3 Value analysis-scope techniques and job plan, Standardization, Renard series, Simplification visa - vis Variety in products .Patents, copyright and Intellectual Property Rights.
4. Marketing Management: Philosophies of Marketing, Market and Product strategies, BCG matrix, Portfolio management, New Product development strategy.
5. Marketing channels, Pricing strategies and Promotional strategies, Consumer behavior, Sales Management, Planning of sales, Sales skills, evaluation and promotion, Advertising methods, preparation of advertising briefs.

**Books &References Recommended :**


1. Chitale A. K. and Gupta R. C., Product Design and Manufacturing, PHI.
2. Gupta V., Lal G.K. and Reddy ,"Fundamentals of Design and manufacturing" Narosa Publishing.
3. James Garrat, Design & Technology, Cambridge University Press.
4. Dieter, Engineering Design, Marketing Management, PHI.
5. Kolter, Philip, Marketing Management, PHI.
6. Stanton, Principles of Marketing, Prentice Hall.

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**Industrial Production Engineering, VII-Semester**

**Open Elective IP- 703 (C) Total Quality Management**

## COURSE CONTENTS

**UNIT 1** Evolution of Total Quality Management, Historical perspective. People involvement, Teamwork, Discipline, Supplier involvement, defining the immediate customer, Quality at source.

**UNIT 2** Elements of TQM: Total employee involvement, Elimination of Waste and problem exposure, Total Quality Control Systems, SPC and ISO 9000, Demings wheel, Deming 14 points-Pros and Cons in Industrial Engineering context. Philip Crosby Philosophy, Ishikawa Diagram. Just-in-time philosophy, Design and Development strategy in TQM, Quality function development.

**UNIT 3** Just-in-time Management: Problems of queues, Tenets of JIT. Load smoothing, Push vs pull method of production, Set up time reduction.

**UNIT 4** Total Productive maintenance (TPM), Kaizen and continual improvement, Cost benefit analysis, Life cycle costing.

**UNIT 5** Application of TQM to service type organizations, Service guarantees, case studies on application of TQM to service type organization, Various quality awards, cost benefit analysis, Life cycle costing.

## TEXT BOOKS RECOMMENDED:

1. D. D. Shanna, TQM, Sultanchand
2. Chitale and Jain, TQM & ISO -9000

## REFERENCES RECOMMENDED:

1. Juran J M, Quality Planning and Analysis