

NATIONAL PRODUCTIVITY COUNCIL

PROSPECTUS

for

**One Year Post Graduate Programme In
INDUSTRIAL ENGINEERING**

2009 - 2010



**Dr. AMBEDKAR INSTITUTE OF PRODUCTIVITY
No. 6, SIDCO INDUSTRIAL ESTATE
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NATIONAL PRODUCTIVITY COUNCIL

The National Productivity Council, established in 1958 is an autonomous organization registered as a society. It is tripartite in its constitution and representatives of Government, employers and workers and various professional bodies participate in its working. Besides its headquarters at New Delhi, NPC operates through twelve Regional Directorates and three Regional Offices. Its activities are further extended by nation-wide network of 48 Local Productivity Councils.

The objective of NPC is to stimulate productivity consciousness in the country and to provide productivity services with a view to maximizing the utilization of available resources of men, machines, materials and power, to wage war against waste, and to help secure for the people of the country a better and higher standard of living. To this end, NPC collects and disseminates information about the concept and techniques of productivity and management through various publications including periodicals and audio-visual media of films, radio and exhibitions. It organizes and conducts seminars and training programmes for various levels of management in the subjects of productivity and management.

With a view to demonstrating the validity and value application of productivity and management techniques, NPC offers consultancy service (Productivity Survey and Implementation Service) for which the demand has been steadily rising. The service is intended to help industry; departments of Government and service organizations adopt techniques of better management and operational efficiency consistent with the economic and social aspirations of the Nation.

NPC has established various other specialized services, such as Fuel Efficiency Services, Plant Engineering and Production Engineering Services, Productivity Services for public sector undertakings, public utilities, public administration, post-harvest operations in agriculture and small industries; Applied Productivity Research for evolving trends and indices of productivity in the core sector of economy; National Scheme of Supervisory Development under which an examination is held and National Certificate in Supervision is awarded to the successful candidates and Productivity Programmes for Trade Union Leaders and Workers. NPC also conducts institutional training programmes for the development of consultants in Productivity and Management in the areas of Industrial Engineering, Fuel Efficiency, Plant Engineering, Behavioural Sciences, Finance Management, Marketing Management and Agricultural Productivity.

NPC's professional staff consists of about 150 highly qualified and experienced specialists representing various disciplines relevant to management and productivity. NPC possesses a well-equipped Library-cum-Documentation Centre.

BACKGROUND

In a growing economy like ours, the need to introduce productivity techniques, measures and methods requires barely any emphasis. The finite nature of material and other resources requires a reappraisal of contemporary methods of management and manufacture with stress laid on revising and implementing optimal systems. There are many management sciences which steer to productivity improvement programmes in different spheres of economic activities. In India and all over the world, Industrial Engineering, perhaps, is pioneering management science which found its application in industry for resources utilization. ILO, in the earlier years, demonstrated the efficacy of Industrial Engineering techniques as a means of raising productivity and improving the quality of work life.

Recognizing the need for extending the services of qualified Industrial engineers to the country, NPC introduced in 1963 Post Graduate Training programme in Industrial Engineering. Since then over 820 engineers have been or being trained in this discipline in 34 programmes. They operate in organizational, sectoral and national levels.

OBJECTIVE

The objective of the programme is to develop practice-oriented specialists equipped with diagnostic skills, solution/system development, training, research, etc. through the following aims:

- To provide the participants with tools and techniques in the design of an optimal system for utilization of resources.
- To equip them with the up-to-date knowledge about the design, operation and evaluation of organizational systems within the framework of management disciplines.
- To inculcate methodical approach and develop excellent analytical and creative abilities for problem solving.
- To enable them appreciate the need for data-based information for their analysis and methodical outputs.
- To develop leadership, networking and communicating abilities.
- To develop capability to work as change agents.

ELIGIBILITY

Candidates should have acquired at least Bachelor's Degree in Engineering/Technology in the following branches: Mechanical, Electrical, Chemical, Electronics, production & Industrial with an aggregate of 55% marks. Preference will be given to candidates with practical experience. Candidates appearing at the final degree examination can also

apply, but must produce final mark sheet before appearing for Eligibility Test. They must have excellent analytical and creative bent of mind, aptitude for applied work and good personality

Candidates should be below the age of 28 years on 1.11.2009. Age is relaxable by 5 years for SC/ST candidates.

AWARD OF CERTIFICATE

Candidates who qualify in examinations, project studies and other evaluation will be awarded a Postgraduate Certificate in Industrial Engineering. The PG is widely recognised and accepted by Industry.

The following medals are awarded:

1. NPC Chairman's Gold Medal to the best candidate.
2. NPC Director General's Silver Medal to the second best candidate.

SELECTION

After Screening of applications, candidates will appear at their own cost for written examination at one of the centres specified. Those qualified will be called for group discussions and personal interview and for which second class sleeper train fare/state road transport bus fare will be reimbursed.

VENUE

Dr. Ambedkar Institute of Productivity, National Productivity Council, 6, (Old No.31-B), SIDCO Industrial Estate, Ambattur, Chennai-600 098.

HOSTEL

The Institute has Hostel facilities which have thirty single rooms and eight double rooms to accommodate the participants and the faculty. The hostel is equipped with Kitchen Recreation and other amenities.

CURRICULUM

The selected candidates will undergo intensive, comprehensive and practice oriented classroom training at the Institute lasting about a year. The curriculum prescribed for the course is the outcome of blending experience of training and consultancy work that NPC has accumulated for about forty years. The broad coverage of subjects is given separately.

FACULTY

The Institute has a core faculty group. The Institute also draws the chief/senior consultants of NPC who possess wide practical experience from its various Offices. Experienced guest speakers from industries, business organisations, institutions and professional bodies are also invited to share their experience. A list of core faculty is given at the end.

METHOD OF TRAINING

The training is imparted through class-room lectures, group discussions, case studies, business games, role plays, audiovisual aids, self & group learning methods, etc.

PROJECT WORK & ON THE JOB TRAINING (OJT)

Each candidate will undertake one in-plant project in industrial/commercial organisations at the end of first semester & undergo OJT in any of the NPC offices at the end of second semester. This will provide them opportunity to gain confidence by applying techniques learnt to live problems.

PROGRESS

The progress of each candidate will be monitored through examinations, quiz, exercises, project work, and practical training. In case of poor performance, indiscipline, misbehaviour, lack of interest, poor conduct, etc. training may be terminated without assigning any reasons. In cases of excessive absence, the training may also be extended.

LIBRARY

The Institute library holds about 4500 books, journals, in addition to numerous consultancy, project and thesis report and seminar proceedings. The Institute has loan facility with libraries of IIT, British Council, American Library etc.

DATE OF COMMENCEMENT

The programme commences on 16.11.09

APPLICATION

The application form is available on web site www.aipnpc.com . The candidate should take a print out of the same, fill it and send it along with a fee of Rs 800/- (Rs400/- for SC/ST) by demand draft in favour of National productivity council payable at Chennai along with copies of proof of educational qualification, date of birth, caste certificate if applicable. Please write your name & application Number on reverse of DD

COURSE FEE

1. Self Sponsored candidates- Rs.1,00,000/- per year (Rs.50,000/- per semester)

2. Industry sponsored candidates- Rs.2,00,000/- per year

PROGRAMME ADMINISTRATION

FOUNDATION MODUELS (150 hours)	APPRECIATION MODUELS (75 hours)
Productivity Statistics Gen. Mgt. & Beh. Sciences Financial Management Cost & Budgetary Control	Interfirm Comparison & Bench Marking Strategic Management 5S & Kaizen BPR TPM
APPLICATION MODUELS (975 hours)	
Work Study Production Management EDP ,System Analysis & Design ERP Management Information system Facility Planning & Design Project Management	Maintenance Management & Engg. Operations Research Job Evaluation Training Techniques & communication Meth. of Consultancy & Report Writing Quality Management

PROJECT & OJT (360 hours)

CURRICULUM IN DETAIL

A. FOUNDATION MODULES

1. STATISTICS 30 Hrs.

Probability distributions: descriptive statistics, parameters and dispersion; sampling estimation, null hypothesis; tests of statistics, frequency distributions-Measure of central tendency and significance; Curve fitting, correlation and regression analysis, analysis of variance, design of experiments; Moving averages, exponential smoothing; presentation of data, reliability measurements.

2. GENERAL MANAGEMENT & BEHAVIOURAL SCIENCE 30 Hrs.

Historic development of management science, Functions of Management, Planning, Organizational Objectives, Organization principles and functions, Decisions, Decision making, Strategies and policies, Communication, Directive principles, Delegation, Controlling, Management by objectives, Organization development, Motivation and morale, leadership, Current Management Styles. Organization Behaviour, Organization theories: Participative Management, Conflict Resolution, Team Building, Time Management.

3. A. FINANCIAL MANAGEMENT 20 Hrs.

Financial Accounting, Principles of accountancy, Classification of accounts and records, Profit and loss account balance sheet. Financial ratios and analysis and interfirm comparison. Cost, Selling costing Price. Elements of manufacturing costs, Standard costing, Overhead distribution, Valuation of Inventories.

3. B. COST & BUDGETARY CONTROL 20 Hrs.

Uses of budget, Budgeting for control of costs and revenues, Financial Budget, Inflation accounting, taxation Laws and Planning. Value added analysis, Flexible budgets, Cash flow statements and working capital management, Financial reports, Performance budgeting.

3. C. MANAGERIAL ECONOMICS 20 Hrs.

Equivalence compound interest factors, annual costs and present worth; Discounted Cash Flow method of Project, Feasibility Evaluation, Rate of return of additional investment; Breakeven and minimum cost point studies.

4. PRODUCTIVITY 30 Hrs.

Productivity strategies & techniques, Concept, meaning and philosophy of productivity and standard of living; productivity and enterprise and national level, productivity indices, capacity utilization and profit relationship. Productivity and Planning and monitoring, service sector productivity. Impediments and problems of productivity.

B. APPLICATIONS MODULES

1. WORK STUDY

A. WORK SYSTEM DESIGN 30 Hrs.

Work structuring, work system design, man machine system design; work study and its benefits to society, basic steps of methods study; selection, recording techniques – operation process chart, flow process chart, flow diagrams, activity charts, etc., principles of motion economy, human engineering, workplace layout, design of tool and equipment, critical examination, development, Jigs & Fixtures, SMED/Quick changeovers, Poka Yoke Systems, mathematical and cost-based evaluation, work design implementation, work organization, work ethics.

B. ORGANIZATION & METHODS 15 Hrs.

Functions of Office, Systems & Procedures, Filing systems & design, Record Control, Office equipment, Work procedure simplification, Form design & Control, Organization, Office automation, Computer application & paperless Office.

C. VALUE ANALYSIS 15 Hrs.

Modern Materials applications, Relationship with productivity cost & quality, value analysis methodology, types of functions, Analysis of functional cost and value, FAST Techniques, Road blocks and result accelerators.

D. WORK MEASUREMENT 45 Hrs.

Time study and production study; elements, rating, allowances, Predetermined motion time systems and MTM, Analytical estimation, activity sampling, time-ladder techniques; measurement of indirect work and office activities, standard data and synthetic time standards,

E. INCENTIVE SCHEMES 15 Hrs.

Pre-requisites of Incentives, Design of scheme; Factors, norms, performance-payment relationship; individual, group and plant wide schemes, schemes for efforts & savings, Productivity Motivation: Scanlon plan, Productivity Linked Incentives/Bonus, Evaluation of benefits, pitfalls of Incentives, Agreement clauses.

2. PRODUCTION MANAGEMENT

2. A. PRODUCTION PLANNING & CONTROL 60 Hrs.

Introduction to Production Planning and Control, effects of types of manufacture, forecasting, Master Production Schedule, Aggregate Planning, process planning, make or buy decisions, economic manufacturing quantities, inventories, effective planning and control, scheduling, loading, despatching, follow up systems and procedures of production planning and control; evaluation of its function; LOB charts and controls: Mathematical models in PPC decisions; application in PPC. Just-in-time manufacturing systems. Integrated PPC/Material Systems. MRP & MRP-II, Flexible Manufacturing Systems, Computer Applications.

2 B. ERP 30 Hrs.

Introduction to ERP, Modules of ERP – Finance & A/cs. Material Management, PPC, Logistics, Supply Chain Management, Parameters of ERP selection, Support Systems of ERP, ERP implementation, ERP organization.

2. C . MATERIALS MANAGEMENT 30 Hrs.

Definition of Inventory, types of inventory & inventory problems, storage and issues, records and stores accounting: Stores layout Inventory Analysis and Selective Control policies, Inventory Costs, economic order quantity, Safety stocks, Inventory models; classification and coding, variety reduction, standardization, purchasing function, purchasing principles, purchasing procedures and purchasing policies; tenders, Vendor development; Vendor rating, computer application in Inventory control. Stock verification systems, Surplus Analysis and disposal.

2. D. SUPPLY CHAIN MANAGEMENT & LOGISTICS MANAGEMENT 30 Hrs.

Strategic issues in Supply Chain Management, Corporate profitability, Best practices, Customer focus, Inventory & logistics Management, Vendor Management – long term supplier, real vendor cost management, Distribution Channel, design, reengineering of supply chain, its applications in enable supply chain management.

Concepts; Logistical Management, logistical systems, logistical operations, logical co-ordination, Elements of Transportation, Inventory, storage & materials handling. Logistical policy & planning – cost analysis, customer service policy, planning procedure. Design techniques, operation techniques logistical system & organization concept & dimensions of change. Plant location factors, general procedure & check list, marketing approach to distribution channel structure.

2. E. QUALITY MANAGEMENT

90 Hrs.

QUALITY CONTROL & QUALITY ASSURANCE

Scope of quality control, process control, measurement and variability measurement, sampling for quality control, process improvement, X, R, C, P Charts, Tests of significance, principles of experimental Design, incoming material control, Indian standards for charts & sampling, Inspection methods: Quality assurance Quality Cost, Computer application in Quality Control.

TOTAL QUALITY MANAGEMENT (TQM)

Productivity and total quality, concepts and process of TQM, Kaizen techniques, 5S Organization for TQM, quality management systems and ISO 9000, standards for different enterprises, Quality Policy, Procedures and work, quality circles – concept, philosophy, monitoring and evaluation, Participation and people involvement through quality Circles, Quality audit.

SIX SIGMA

Concepts & Philosophy, DMAIC cycle, Introduction to FMEA, Design of experiments, Signal to noise ratios

INTERNATIONAL QUALITY STANDARDS & SYSTEMS

Various International Standards, their evaluation, performance and self assessment model.

3. INFORMATION TECHNOLOGY

60 Hrs.

Introduction to data processing, computer hardware and software, programming languages such as basic, Software's such as excel spreadsheets, data management (dbase & FoxPro) & Fourth generation languages, exercise on flow charts, exercise on simple programmes, system analysis and design; and document flow charts, different types of files and file design; input-output form design and flow diagram. Operating systems, introduction to software design. Practical projects.

4. MANAGEMENT INFORMATION SYSTEM (MIS)

30 Hrs.

Essentials of Management Information: Vital & Information Reporting by exception, routine & special reports, periodic type system analysis, objectives of the system, system design considerations, Traditional Manufacturing information Systems, Functions of Production, Inventory and cost management, Material and the capacity requirement planning, financial performance reporting; data base technology, relevance of data base for computerized MIS; MIS implementation and maintenance, computer simulation for decision making. Decision support systems.

5 PROJECT MANAGEMENT & PROJECT PLANNING & CONTROL 30 Hrs.

Introduction, use of PERT for management decisions, preparation of networks and analysis, network computation, floats, matrix methods, preparation of squared network, PERT cost principles, chasing of programme, resource allocation, manpower leveling, scheduling, updating revision and reviewing PERT time cost performance, computer application in PERT; Contract Management.

6. PLANT LAYOUT & MATERIALS HANDLING 45 Hrs.

Plant Locating – Locating factors – plant layout – types of manufacture and layout – legislation w.r.t layouts – Types of layouts, Development of block, shop & workplace layouts. Aids to develop layouts, Layout of lines and group technology, Line balancing. Flexible manufacturing systems, office layout, colour wash schemes, principles of storage, horizontal and vertical space, FSN analysis of RM goods; material location, storage, identification to layout; diagnosis and analysis of MH problems; physical and chemical, material or characteristics and choice of MH equipment; specifications of materials handling equipments; simulation of facility planning; Unit handling systems, packaging and containerization, Bulk handling.

7. MAINTENANCE MANAGEMENT & ENGINEERING 30 Hrs.

Maintenance concepts, systems and functions; preventive maintenance; break-down maintenance & corrective maintenance; planning and control; maintenance organization; categorization of machines and equipments; Inspection methods and checklists; maintenance records and paper work, P.M. system; work order system and maintenance control; scheduling parts and machines; Renewal theory and practice, Replacement analysis.

8. OPERATIONS RESEARCH 30 Hrs.

Introduction to Operations Research, model building; allocation models, linear programming, problems, waiting time models, queuing models, sequencing models, replacement, models, elementary application, network models in decision making, simulation models; Discrete optimization and computer algorithms, integer programming, Dynamic Programming, Computer packages.

9. JOB EVALUATION 30 Hrs.

Components of pay, equitable pay, methods of administration of pay, methods of Job Evaluation, Job Definitions, Job Evaluation Plan, Job Analysis, Job Description Plan Testing, Job Rating, Categorization, Linking with pay, Wage Survey, Executive position Evaluation, problems of Implementation, job Rotation, Job Enrichment.

10. TRAINING TECHNIQUES & COMMUNICATION 30 Hrs.

Training policies, determination of training needs, designing and administering training programmes, training methods, training aids, evaluation of programmes and practice sessions, communications, principles of learning, motivating the learner, development of programmed lessons; Modular programmes and their structuring; Lectures, Case Study development, Business games design, role play; audio visual aids and their preparations; Computer-interactive learning.

11. METHODOLOGY OF CONSULTANCY AND REPORT WRITING 30 Hrs.

Objectives and scope, initial contact; Preliminary diagnostic and sectoral surveys, report, writing; report presentation, code of ethics, evaluation. Purpose of reports, types and structure of reports, preparation of reports, characterization of good reports; checklists for report writing; presentation of reports to top management and others.

C. APPRECIATION MOUDLES

1. INTERFIRM COMPARISON & BENCH MARKING 15 Hrs.

Competitiveness of business units, Intra & inter-firm comparison Financial ratio analysis, Value added ratios, Manufacturing competitiveness, Quality competitiveness, Process & result Bench marking, Business analysis thro' strategic Benchmarking.

2. STRATEGIC MANAGEMENT 15 Hrs.

Concept and scope of strategy management, charter of objectives, corporate strategy formulation strategic business unit analysis and recommendation, Tactical programme variable and discretionary components, strategic management control and rewards.

3. 5S & KAIZEN 15 Hrs

Kaizen concepts, Kaizen tools, seven wastes, innovation vs. kaizen, PDCA, Kaizen mechanism, implementation of kaizen case studies, concepts and implementation of 5S.

4 BPR 15 Hrs.

Concepts of BPR, objectives of BPR, Business processes, Business Process Analysis, IT in Business Process Redesign, steps for redesigning business process with IT, measurements of redesigned processes, design of prototype process management, issues in IT to enable redesign

5. TPM 15 Hrs.

Concepts of TPM, features of TPM, maximizing equipment effectiveness, OEE, organizing for TPM implementation, TPM implementation and Stabilization.

FACULTY

1. **Mr. R.Virendra
Director Head(AIP)** Energy Management
2. **Mr. H.R. Jindal,
Director** Energy Management
3. **Mr. V.S.S. Bhaskaramurty, Director,
Coordinator Env Mgt Prog.** Air Pollution Monitoring, Design &
Up-gradation of Control Systems
4. **Mr. P. Dharmalingam Director,
Co-ordinator (EM)** Energy Management
5. **Mr. S. Shivakumar, Director,
Coordinator IE Prog.** Production Management, HRD,
General Mgt., Manufacturing Mgt.
6. **Mr. R. Suryanarayanan
Deputy Director (Sr.)** Environmental Mgt. & Energy Mgt.
7. **Mr. J. Nagesh Kumar
Director** Energy & Environmental Mgt.
8. **Ms. Chitra .P, Asst. Director** Energy Management.
9. **Mr. M. Xavier, Director** Technology Management
10. **Mr. M.Natarajan
Dy. Director** Technology Management
11. **Mr. B.Girish,
Dy.Director** T.Q.M
12. **Mr. R.S. Maharajan,
Dy. Director** Industrial Engineering
13. **Mr. K.Vijayaraju Asst. Director** Industrial Engineering/Energy Mgmt
14. **Mr. V.Velayutham Asst.Director** Energy Management
15. **Mr. Pavan Kumar Riyali Asst.Director** Energy Management

INDUSTRIAL ENGINEERING PROGRAMME – STRUCTURE
(During – 12 months : 3 TERM’S)

TERM– I Subject	Hrs.	TERM – II Subject	Hrs.	TERM – III Subject	Hrs.
Productivity	30	EDP Systems, System Analysis & Design	120	Project Planning & Control	30
General Management & Behavioural Science	30	Plant Layout and Material Handling	45	Strategic Management	15
Job Evaluation	30	Production Planning & Control	60	Interfirm Comparison/BM	15
Financial Management	20	ERP	30	5S/ Kaizen	15
Cost & Budgetary Control	20	Material Management	30	BPR	15
Managerial Economics	20	Supply Chain Management & Logistics Management	30	TPM	15
Operations Research	30	Quality Management	90	Examination	30
Statistics	30				
Work System & Design	30				
Organization & Methods	15				
Value Analysis	15				
Work Measurement	45	Maintenance Management	30		
Incentive Schemes	15	Management Information Systems	30		
Methodology of Consultancy & Report Writing	30	Training Techniques & Communication	30		
Examination	60	Examination	60		
Total Class Room Coverage	390		555		135
In-Plant Project – I	180	OJT	180		
Vacation	120				
Total for the Semester	690		735		135

Grand Total :1560 Hrs. = 52Weeks