Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Program Name: Three Year Diploma in Cement Technology [C01]
(V Semester)

Name of Scheme: Jul.08 Exam Code: * Implemented From: 2008-09

Sub Code	Paper Code	Name of Subject	SCHEME OF STUDIES			SCHEME OF EXAMINATION												
			Hours per Week			Sess. Marks		Prog. Assm		Sess + Prog	UNIV. EXAMINATION						TH+PR.	
			TH.	PR.	TOTAL	Term Work	Lab work	I	II	Total Internal Assessment	Th. Paper	Duration	Marks	PR	Duration in Hrs	Mks.	Total External assessment	Total Marks
501	6307	Unit Operation -II	06	-	06	30	-	10	10	50	01	3 Hrs	100	-	-	-	100	150
502	6308	Computers in Cement Processing	04	02	06	15	15	10	10	50	01	3 Hrs	100	01	03	50	150	200
503	6309	Instrumentation and Control	06	02	08	15	15	10	10	50	01	3 Hrs	100	01	03	50	150	200
504	6310	Heat and Mass Transfer	06	02	08	15	15	10	10	50	01	3 Hrs	100	01	03	50	150	200
505	6311	Energy Management	06	-	06	30	-	10	10	50	01	3 Hrs	100	-	-	-	100	150
506		Professional Activities	-	02	02	-	-	-	-	-	-	-	-	-	-	-	-	-
507		Inplant Training	One month inplant Training				50	-	-	-	-	-	-	-	-	-	-	50
			28	08	36	105	95	50	50	250	05	-	500	04	-	150	700	950

1. Number of Theory Papers : 05
2. Total theory Marks : 500
3. Number of Practicals : 04
4. Total Practical Marks : 200
5. Total marks of Sessional + Prog. Asst. + Pract. : 250
6. Grand Total : 950

Passing marks for (a) Theory : 33% (b) Practical : 40%
(c) Sessional : 60% (d) Inplant Training: 60%

CURRICULUM

FOR

DIPLOMA IN CEMENT TECHNOLOGY

(FIFTH SEMESTER)

Scheme: JULY2008
Implemented from session 2008-09

Under semester system

JULY 2008

CURRICULUM DEVELOPMENT CENTRE
CEMENT TECHNOLOGY DEPARTMENT

RAJIV GANDHI PROUDYOGIKI VISWAVIDYALAYA, BHOPAL

DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **501** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **UNIT OPERATION - II**
PAPER CODE: 6307

RATIONALE

In the first part of the Unit Operation, students are made familiar with the processing of cement up to Silos. In this part of Unit Operation – II students are enabled to understand subsequent operations like pyro processing, coal grinding, cooling of clinker, cement grinding and packaging.

It is included with the aim of developing skills in various operations which help them to work in actual environment.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **501** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **UNIT OPERATION – II** PAPER CODE: 6307

SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: 6 Hrs. Per week

S. NO.	TOPIC	SCHEME OF STUDIES Hrs. of Study			SUGGESTED DISRTIBUTION OF MARKS FOR THEORY PAPER
		Theory	Practical	Total	
8.	Pyro processing (Kiln operation)	28	-	28	20
9.	Coal Grinding Plant	16	-	16	20
10	Cooling of clinker	16	-	16	20
11	Cement grinding	18	-	18	20
12	Packaging	12	-	12	20
	Total	90	-	90	100

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **501** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **UNIT OPERATION - II**
PAPER CODE: 6307

COURSE CONTENT

Lectures: 6 Hrs. per week

S. NO.	Course Content	Hours of Study
1.	**PYRO PROCESSING (KILN OPERATION):** Types of Kilns, different type of clinkeration process, wet process, semi-wet process, dry process, advantage-disadvantages of each process, chain type system in wet process, Lepol grate kiln, heat requirement in wet process, L/D ratio, Thermal heat calculation, sizing of kiln, Heat balance of kiln, air balance of kilns, inlet seal, methods used to feed raw meal in the kilns, different types of preheaters, theirs advantage and disadvantages, selection of preheaters, effect of leakage on kiln operations, optimization of kiln output, factors affecting the kiln output, determination of C.C. /M.C. and residue of kiln feed, determination of lifter-weight clinker, Firing system – different types of firing system, their advantage and disadvantages, conveying of pulverized coat to kiln, calcinations and its control, process parameters like velocity, Temperature draft at various stages, instrumentation – Thermocouples, optical – pyrometer, speed indicators, shell radiation scanners, shell cooling fans, parameters 0_2, CO, CO_2, NOX, SOX, capacity meter, measurement by pitot tube. Flame characteristics. Trouble shooting in kilns, coolers and preheaters.	28

2.	**COAL GRINDING PLANT:** Preparation of fuel burning, sampling of coal, proximate and ultimate analysis of coal, calorific value and its determination, crushing of coal, grinding of coal, different types of mills, ball mills, vertical mills, advantages and disadvantages of each operations, L/D raio of mills, residue and moisture determination and their control generation of waste gases, removal of fine coal from dust- laden gases, different equipment used, cyclones, bag filters and ESPS.	16
3.	**COOLING OF CLINKER:** Different types of cooler used, their operation and control, planatory coolers, grate coolers, C.F.G coolers, cooling efficiency, air requirements for cooling operation, Hammer mills, drag chains, different methods of clinker cooling and their advantages, methods of clinker storage, silos, gantry.	16 18
4.	**CEMENT GRINDING:** Types of mills, L/D ratio, ball mills, V.R.M., roller press, their working, optimization of grinding mills, selection of grinding media, its wear rate, control of specific-surface and setting time, different types of weight feeders, methods used to convey cement to silos.	
5-	**PACKAGING:** Different types of packers, their operation and selections, storage of cement in silos, methods of extraction from cement silos, types of bags – jute bag, H.D.P.E., paper bags, polypropylene bag, loading of cement in wagons and trucks, determination of specific surface and setting time of cement. Historical evolution of manufacturing process and recent trends.	12

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COURSE CODE: **501** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **UNIT OPERATION - II**
PAPER CODE: 6307

REFERENCES

1. Cement Data Book, International Process Engineering in the Cement Industry, IInd Completely revised and enlarged new edition. Macdonald and Evans, London.
2. Unit Operations of Chemical Engineering, 4th Edition, Warren L.McCabe, Julian C.Smith, Peter Harriott,

   McGraw Hill International Editions (Chemical Engineering Series)
3. Rotary Kiln Technology, World Cement.
4. Materials Handling in the Cement Industry, World Cement.
5. Cement Data Book, Vol. I, II and III, by walter H.Duda,
6. Cement Engineers Handbook by Lahahn/Kohlaas, Bauverlag GMBH.
7. Process Technology of Cement Manufacturing,

   By Zementwerke

RAJIV GANDHI PROUDYOGIKI VISWAVIDYALAYA, BHOPAL

DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **502** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **COMPUTERS IN CEMENT PROCESSING**
PAPER CODE: 6308

RATIONALE

In the second semester of diploma course students are made aware with computer components, hardware, application software and its utilization.

Computer in Cement Processing is an advanced course enabling the students to fulfill job functions efficiently. This course is designed with a view to understand the use of computers and techniques required to execute the work at fields in cement processing and Quality Control through simulation.

By studying the course, students will develop knowledge about Cement processing & they will get practical experience of technical advancements in the field of Cement manufacturing.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **502** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **COMPUTERS IN CEMENT PROCESSING**
PAPER CODE: 6308

SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: **4** Hrs. per week
Practical: 2 Hrs. per week

		Theory	Practical/ Tutorials	Total	SUGGESTED DISRTIBUTION OF MARKS FOR THEORY PAPER
1.	Programmable logic controllers	10	06	16	15
2.	Raw Mix Control.	10	04	14	15
3.	Control of Grinding Circuits	10	04	14	10
4.	Rotary Kiln control.	10	04	14	15
5.	Fuzzy Logic Kiln control	08	04	12	15
6.	Hierarchical Control	06	04	10	15
7.	Kiln simulator	06	04	10	15
		60	30	90	100

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **502** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **COMPUTERS IN CEMENT PROCESSING**
PAPER CODE: 6308

COURSE CONTENT

Lectures: **4** Hrs. per week

S. NO.	Course Content	Hours of Study
1.	**PROGRAMMABLE LOGIC CONTROLLERS :** Sequential interlocking for group of motors, interlocking of motors with process parameters, Hardwire and software interlocks ladder diagrams advantages of PLCs over conventional system use of PLCs.	10
2	**RAW MIX CONTROL :** X-ray fluorescence analysis, Automatic samplers, on-line x-rays analysis, schematic drawing of a on-line computerized raw mix, proportioning operation, set points.	10
3.	**CONTROL OF GRINDING CIRCUITS :** Principle of control for optimizing of grinding through a computer. DDC control elements, Block diagram for the systems.	10
4.	**ROTARY KILN CONTROL:** Principle of control 'Ideal Model' Vs. Adaptive Model' Primary	10

	subsystem, Variable required, Block diagram.	
5.	**FUZZY LOGIC KILN CONTROL :** Simplified flow charts for kiln control scheme and kiln control strategy according to 'Fuzzy logic'	08
6.	**HIERARCHIAL CONTROL :** Control technique of hierarchical structure and distributed intelligence schematic of control hierarchy for a cement plant.	06
7.	**KILN SIMULATOR :** Simulation pirating conditions on kiln simulator.	06

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SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **502** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **COMPUTERS IN CEMENT PROCESSING**
PAPER CODE: 6308

LIST OF EXPERIMENTS
Practical: 2 Hrs. per week

S. NO.	Name of experiments	Hours of Study
1.	Making programme in BASIC Language. Feeding of inputs to get required output using above make programme. Make a input V/s output chart.	
2.		
3.	Function of PLC and interlocking using PLC. Visit in nearby cement plants and (a) Make a report on operation of X-Ray spectrometer. (b) Make a report on calibration of X-Ray Spectrometer. (c) Make a report on on-line Raw Mix Proportioning. (d) Make a report on optimising Cement and Raw mill grinding using computer.	
4.		
5.	Optimising kiln using computer.	
.	Study of Simulator.	
	TOTAL	30

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COURSE CODE: **502** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **COMPUTERS IN CEMENT PROCESSING**
PAPER CODE: 6308

REFERENCES

REFERENCE BOOKS:

1. Computer Aided Process Plant Design 1982

   By M.E.Leesly, International Book House Pvt. Ltd., Bombay 23.

2. Computer Programming for science and Engineering,

   By L.L.Bhirud, International Book House Pvt. Ltd., Bombay 23.

3. Introduction to Microprocessors using laboratory Exercises

   By L.C. Jain, Khanna Publishers

4. Introduction to Microprocessors, Software, Hardware, Programming

   By Leventhal, Prentice Hall of India.

5. Microcomputers/Microprocessors, Hardware, Software and Applications, by Hilburn and Julich, Prentice Hall of India.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **503** COMMON WITH PROGRAMME (S)
NAME OF COURSE: **INSTRUMENTATION AND CONTROL**
PAPER CODE: 6309

RATIONALE

The purpose of keeping this subject is to familiarize with principles and practices of controls in a cement plants and related instrumentation. After completion of this course, a student will be familiar with the various control devices and instrumentation in a cement plant and their operation and maintenance.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **503** COMMON WITH PROGRAMME (S)
NAME OF COURSE: **INSTRUMENTATION AND CONTROL**
PAPER CODE: 6309

SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: 6 Hrs. per week
Practical: 2 Hrs. per week

S. NO.	TOPIC	SCHEME OF STUDIES			SUGGESTED DISRTIBUTION OF MARKS FOR THEORY PAPER
		Hrs. of Study			
		Theory	Practical	Total	
1.	General Principles	06	04	10	
2.	Transducers	06	02	08	
3.	*Measurement of temperature*	06	02	08	
4.	Measurement of displacement	06	04	10	
5.	Measurement of pressure	06	04	10	
6.	Level Measurement	10	04	14	
7.	Gas analysis	10	06	16	
8.	Automatic control system	15	-	15	
9.	Automatic controllers	10	04	14	
10.	Control elements	15	-	15	
	TOTAL	90	30	120	100

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **503** COMMON WITH PROGRAMME (S)
NAME OF COURSE: **INSTRUMENTATION AND CONTROL**
PAPER CODE: 6309

COURSE CONTENT

Lectures: **4** Hrs. per week

S. NO	Course Content	Hours of Study
1.	GENERAL PRINCIPLES:- Principles of feedback and feed forward control, general performance and characteristics of instruments and instrumentation. errors, calibration, concepts of stability and optimum control.	04
2.	TRANSDUCERS:- Definition, Different types of transducers and transduction principles, selection of transducers, application of transducers, block diagram of instrumentation system.	
3.	MEASUREMENT OF TEMPERATURE:- Thermometer, Bimetallic strip, Resistance thermometer, thermocouple, thermopile, resistance temperature detectors (RTD), thermostat, radiation pyrometer, optical pyrometer	05
4.	MEASUREMENT OF DISPLACEMENT Potentiometer device, LVDT, RVDT, variable capacitance transducer, variable reluctance transducer, digital transducer.	05
5.	MEASUREMENT OF PRESSURE Mechanical pressure elements, pressure transducers, potential-metric	

	device, strain gauge transducer, LVDT type transducer, variable capacitance device, piezoelectric pick up ionization gauge.	
6.	**LEVEL MEASUREMENT**: -Different type of level controllers/Sensors. -Level Sensors (Prob type) -Ultrasonic level sensors.	10
7.	**GAS ANALYSIS** Oxygen analyzer, thermal conductivity gas analysis, combustibles, total hydrocarbons and carbon monoxide analyzers.	
8.	**AUTOMATIC CONTROL SYSTEM** On off control system, continuous control system, open loop control system, closed loop control system, transfer function of circuits and devices, proportional control, integral control, PI, PD, PID control.	
9.	**AUTOMATIC CONTROLERS** Chemical process, electrical controllers, pneumatic and electro-pneumatic controllers.	
10.	**CONTROL ELEMENTS** Times, Relays, solenoid, valves, Gear linkages, pivots and jewels, flapper, nozzle system, diaphragm units capsules, servomotors, seasons.	

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
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NAME OF COURSE: **INSTRUMENTATION AND CONTROL**
PAPER CODE: 6309

LIST OF EXPERIMENTS
Practical: 2 Hrs. per week

S. NO.	Name of experiments	Hours of Study
1.	Study of LVDT, RTD, thermocouple, resistance thermometer, thermistors, strain gauge, orifice assembly etc.	
2.	Measurement of voltage, frequency and phase shift by C.R.O.	
3.	Calibration of pressure gauge.	
4.	Calibration of temperature indicator.	
5.	Measurement of displacement by LVDT.	
6.	Measurement of Displacement by LDR.	
7.	Study of synchrony transmitter and receiver.	
8.	Determination of torque speed characteristics of D.C. servomotor.	
9.	Study of stepper motor control circuit and its application for angular position control.	
10.	Study of electronic PID controller.	
	TOTAL	30

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NAME OF COURSE: **INSTRUMENTATION AND CONTROL**
PAPER CODE: 6309

REFERENCES

1. Electrical and Electronic Measurements and Instrumentation – A.K.Sawhney – Dhanpat Rai & Sons Publishers.
2. Instrumentation Devices and Systems – C.S. Rangan, G.R.Sazuna & V.S.V.Mani – Tata McGraw Hill
3. Mechanical and Industrial Measurements – R.K.Jain – Khanna Publishers.
4. Electronic Instrumentation and Measurement Techniques – Cooper W.D. and Halftrack A.D. Prentice Hall of India Pvt. Ltd.
5. Instrumentation for engineering Measurements – Cerni and Foster – John wiley and sons.
6. Industrial Instrumentation and control – S.K.Singh –Tata McGraw Hill.
7. Engineering Instrumentation and Control – D.C. Ramsay – ELBS Edition,Avon Britain.
8. Applied Instrumentation in the Process Industries, Vol.I, IV by Andrews.
9. Automation and Process Control inCement Plants, by Smith WORLD CEMENT
10. Modern Cement Plants, World Cement.
11. Outlines of chemical Instrumentation Process Control., by Suryanarayana, Khanna Publishers.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip. CT_JULY 2008**
COURSE CODE: **504** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **HEAT & MASS TRANSFER**
PAPER CODE: 6310

RATIONALE

This subject is introduced with the aim of imparting knowledge on aspects of heat and mass transfer operations in cement manufacturing industries.

Students are also made aware with various types of heat exchanger and their utilization. Hence this will enable the students to handle problems related to mass transfer and performance of heat exchangers in cement plants.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip. CT_JULY 2008**
COURSE CODE: **504** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **HEAT & MASS TRANSFER**
PAPER CODE: 6310

SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: 6Hrs. Per week
Practical: **2** Hrs. per week

S. NO.	TOPIC	SCHEME OF STUDIES Hrs. of Study			SUGGESTED DISRTIBUTION OF MARKS FOR THEORY PAPER
		Theory	Practical	Total	
1.	*Basic Concepts*	10	2	12	15
2.	*Conduction*	10	5	15	15
3.	*Heat Transfer by Convection*	10	2	12	10
4.	Heat Exchangers	10	5	15	10
5.	Radiant Heat Transfer	10	2	12	10
6.	Heat Transfer with phase change	10	5	15	10
7.	Diffusion & Mass Transfer Between phases	10	2	12	10
8.	Equipment for gas-liquid operations	10	4	14	10
9.	Important mass Transfer Operations.	10	3	13	10
	TOTAL	90	30	120	100

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip. CT_JULY 2008**
COURSE CODE: **504** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **HEAT & MASS TRANSFER**
PAPER CODE: 6310

COURSE CONTENT

S. No.	Course Content	Hours of Study
1	**BASIC CONCEPTS**: Modes of heat & Mass Transfer, Fourier's law, Newton's law, Stefan Boltzmann law, Thermal resistance and conductance, Analogy between flow of heat and electricity, combined heat transfer Process.	
2	**CONDUCTION.**	

	Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates. Linear one dimensional steady state conduction through a slab, tubes, spherical shells and composite structures. Electrical analogies. Critical insulation thickness for pipes. Effects of variable thermal conductivity.	
3	**HEAT TRANSFER BY CONVECTION:** Natural and forced convection. Mean temperature difference, Individual, film and overall heat transfer coefficients. Fins.	
4	**HEAT EXCHANGERS:** Heat exchanger types-Parallel flow, Counter flow (Tube in tube type), Evaporator and Condensers, Overall heat transfers coefficient, Fouling factors, Long-mean temperature difference (LMTD) method of heat exchanger analysis, effectiveness of heat exchanger, NTU method.	
5	**RADIANT HEAT TRANSFER:** Laws, radiation between surfaces, view factors.	
6	**HEAT TRANSFER WITH PHASE CHANGE:** Boiling, condensation.	
7	**DIFFUSION AND MASS TRANSFER BETWEEN PHASES:** Diffusivity, mass transfer coefficient.	

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SEMESTER: **FIFTH** SCHEME: **Dip. CT_JULY 2008**

COURSE CODE: **504** COMMON WITH PROGRAMME (S):

NAME OF COURSE: **HEAT & MASS TRANSFER** PAPER CODE: 6310

COURSE CONTENT

S. NO.	Course Content	Hours of Study

8	**IMPORTANT MASS TRANSFER OPERATIONS:** Absorption, distillation, humidification, leaching, extraction, Drying, Adsorption.	
9	**EQUIPMENT FOR GAS-LIQUID OPERATIONS:** Bubble columns, agitated contactors, tray towers, packed towers.	

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PAPER CODE: 6310

LIST OF EXPERIMENTS

Practical: **2** Hrs. per week

S. NO	*NAME OF EXPERIMENT*	HOURS OF STUDY
1.	Thermal conductivity of materials.	
2.	Double pipe heat exchanger.	
3.	Shell and tube heat exchanger.	
4.	Heat transfer through composite walls.	
5.	Emissivity of Solids.	
6.	Diffusivity of gas.	
7.	Study of plate column, packed columns.	
8.	Study of cooling towers.	
9.	Tray drier.	
10.	Rotary drier.	
11.	Fluidized bed drier.	
	Total	30

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COURSE CODE: **504** COMMON WITH
PROGRAMME (S):
NAME OF COURSE: **HEAT AND MASS TRANSFER** PAPER CODE: 6310

REFERENCES

REFERENCE BOOKS:

- Heat Transfer, J. P. Holman, Ge, Tata McGraw-Hill Pub Co. Ltd.
- Heat Transfer P.K. Nag Tata McGraw-Hill Pub Co. Ltd.
- Heat and Mass Transfer S.P. Sukhatme
- Fundamentals of Engineering Heat and Mass Transfer R.C. Sachdeva.
- Engineering Heat Transfer Gupta & Prakash

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **505** COMMON WITH
PROGRAMME (S):
NAME OF COURSE: **ENERGY MANAGEMENT** PAPER CODE: 6311

RATIONALE

The emphasis of the course will be on steps taken to conserve energy in cement manufacturing. There are also suggestions to use renewable sources of energy to save fossil fuels. Topic on energy audit is given so that optimum utilization of energy can be made. After completion of this course a student will be familiar with the approach to energy conservation measures.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **505** COMMON WITH
PROGRAMME (S):
NAME OF COURSE: **ENERGY MANAGEMENT** PAPER CODE: 6311

SCHEME OF STUDIES AND SPECIFICATION TABLE

Lectures: 6Hrs. per week

S. NO.	TOPIC	SCHEME OF STUDIES Hrs. of Study			SUGGESTED DISRTIBUTION OF MARKS FOR THEORY PAPER
		Theory	Practical	Total	
1.	*Introduction*	10	-	10	10
2.	*Energy requirements*	10	-	10	10
3.	*Energy audit*	15	-	15	20
4.	Thermal Energy	10	-	10	15
5.	Electrical Energy	10	-	10	10
6.	Energy conservation in Heat and Power Generation	10	-	10	10
7.	Renewable Energy Systems	10	-	10	10
8.	Case studies	15	-	15	15
	TOTAL	90	-	90	100

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **505** COMMON WITH
PROGRAMME (S):
NAME OF COURSE: **ENERGY MANAGEMENT** PAPER CODE: 6311

COURSE CONTENT

Course duration: **15** weeks
Lectures: **6** Hrs. per week

S. NO.	Course Content	Hours of Study
1.	**INTRODUCTION** Energy and development Role of energy industrial activity, Contemporary energy crisis conventional and Non conventional energy sources, Energy demand and availability , Energy audit, Energy conservation, Energy conservation techniques in domestic, transport and industrial sector.	08
2.	**ENERGY REQUIREMENTS** Basic approach requirements of thermal and electrical energy global and Indian trends, fuel and combustion process specially coal.	05
3.	**ENERGY AUDIT** Energy monitoring and metering, target setting, the global trend, benchmarking, energy efficiency plant capacity utilization, energy audits, techniques and advantages.	12

4.	**THERMAL ENERGY :** Heat balances kiln-refractory interface, lowering losses , concepts of pre-heating and pre-calcining, role of blended cements.	10
5.	**ELECTRICAL ENERGY** Different electrical equipments in a cement plant, crushers, mills, kiln and fans, motors and drives	10
6.	**ENERGY CONSERVATION IN HEAT AND POWER GENERATION** Fuel consumption economy Firing arrangement and selection of burners, Combustion losses, Efficiencies and heat rates in power generation, Auxiliary power consumption and T&D losses in power system.	10
7.	**RENEWABLE ENERGY SYSTEMS-** Introduction to renewable energy systems, Solar Thermal, Solar photovoltaic, Solar hydrogen power system, wind energy, bio energy.	
8.	**CASE STUDIES** Selected case studies of energy audit and energy conservation measures in Indian cement plant.	

RAJIV GANDHI PROUDYOGIKI VISWAVIDYALAYA, BHOPAL

DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **505** COMMON WITH
PROGRAMME (S):
NAME OF COURSE: **ENERGY MANAGEMENT** PAPER CODE: 6311

REFERENCES

REFERENCE BOOKS:

- Non-conventional sources of energy, G.D. Rai, Khanna Publication, Delhi.
- Hand book of energy audit, Albert Thurman.
- Cement Data Book, All volumes, W.H. Duda, Verlag GmBH, Berlin.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Jul.08**
COURSE CODE: **506**
NAME OF COURSE: **PROFESSIONAL ACTIVITIES**

Practical: **2** Hrs. per week

RATIONALE

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

OBJECTIVES:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmental and ecology etc.

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

KK. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.

LL. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).

MM. Following grade scale of evaluation of performance in PA has been established.

Grades	Level of performance
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

NN. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.

OO. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

PP. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.

QQ. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.

RR. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

SS. Compendium shall contain following:

XXIX. Record of written quiz.

XXX. Report/write up of seminar presented
XXXI. Abstract of the guest lectures arranged in the Institution.
XXXII. Topic and outcome of the group discussion held.
XXXIII. Report on the problems solved through case studies.
XXXIV. Report on social awareness camps(organized for social and environmental prevention).
XXXV. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

N. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content.
These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development.
Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.

RAJIV GANDHI PROUDYOGIKI VISWAVIDYALAYA, BHOPAL

DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **507** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **INPLANT TRAINING**

SCHEME OF STUDIES

Duration: **One month after 4th Sem. Exam.**

SCHEME OF EXAMINATION

Practical/Oral Examination (Viva-Voce)

In Institution	Marks allotted
1. Training Report	25
2. Seminar and cross questioning (defense)	25
TOTAL	50*

*** Minimum passing marks in the practical exam for in plant training will be 60%.**

Marks of various components in industry should be awarded to the students, in consultations with the Training and Placement Officer/Faculty of Institute and I/c of training from Industry. During training students will prepare a first draft of training report in consultation with section in-charge. After training they will prepare final draft with the help of T.P.O./Faculty of the institute. Then they will present a seminar on their training and they will face viva-voce on training in the Practical Examination.

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DIPLOMA IN CEMENT TECHNOLOGY

SEMESTER: **FIFTH** SCHEME: **Dip.CT_JULY 2008**
COURSE CODE: **507** COMMON WITH PROGRAMME (S):
NAME OF COURSE: **INPLANT TRAINING**

1.1 OBJECTIVE OF INDUSTRIAL TRAINING

Industrial training of the students is essential to bridge the wide gap between the classroom and industrial environment. This will enrich their practical learning and they will be better equipped to integrate the practical experiences with the classroom learning process.

1.2 LEARNING THROUGH INDUSTRIAL TRAINING

During industrial training students must observe following to enrich their learning:

- Gain firsthand knowledge on tests conducted to maintain quality of cement.
- To visit QC lab of the plant and study the various testing equipments / machines used..
- To observe and learn to conduct the various quality control test in the lab and prepare write up for each test separately.
- Student will find out the areas himself needing quality control in cement plant.
- Gather broad information on major equipments / machines and instruments used in cement industries in different unit operations along with broad specifications.
- Pyroprocessing and clinker formation.
- Cement manufacturing, packaging and dispatch.
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1.3 GUIDANCE TO THE FACULTY/TPO FOR PLANNING AND IMPLEMENTING THE INDUSTRIAL TRAINING

The industrial training programme, which is spread to one month duration after the third semester examination, has to be designed in consultation with the authorities of the work place, keeping in view the need of the contents. Following are some of the salient points:

- Spelling out the objectives of the industrial training in behavioral terms and same is informed in advance to the 1) students, 2) authorities of the work place and 3) supervising faculty members.
- Discussing and preparing students for the training for which meetings with the students has to be planned.
- Meeting with industrial personnel and orienting them regarding the objective of the training and the expectations of the Polytechnic system.
- Correspondence with the authorities of the work place.
- Orientation classes for students on how to make the training most beneficial - monitoring daily diary, writing weekly reports, how to interact with various categories of industrial personnel, how to behave and undertake responsibilities, how to gather information from the workplace, ethics etc.
- Guiding students to make individual plans (week wise/ day wise) to undertake industrial training
- Developing a system of maintaining training records, by teachers for every batch of students for convenient retrieval.
- Inviting industrial personnel to deliver lectures on some aspects of training.

1.4 ACTION PLAN FOR PLANNING STAGES AT THE INSTITUTION LEVEL

S.No.	Activity	Commencing Week	Finishing week	Remarks
1.	Meeting with Principal			
2.	Meeting with Colleagues			
3.	Correspondence with work place (Industries concerned)			

4. Meeting with authorities of Work place
5. Orientation of students for industrial Training
6. Scrutinizing individual training plan Of students
7. Commencement of industrial training
8. First monitoring of industrial training
9. Second monitoring of industrial training
10. Finalization of Training report
11. Evaluation of performance at Industry level
12. Evaluation of industrial programme in the institution.

1.5 INDUSTRIAL TRAINING
DAILY DIARY

Name of the Trainee:…….Polytechnic:…….
Industry/Work place:……..Week No.:……
Department/Section:…….Date:……

Dates Brief of observations made, work done, problem/project undertaken, discussion held, literature-consulted etc.

Signature of Supervisor Signature of Trainee Signature of Official In-charge for

(TPO/Faculty) Training in Industry

1.6 SUPERVISION OF INDUSTRIAL TRAINING

- One polytechnic faculty member or TPO will plan Industrial training of students in consultation with training manager of the industry (work place) as per the predefined objectives of training.
- During training students will maintain a proper daily diary (format enclosed). Main purpose of daily diary is to inculcate the habit of systematic recording of learning experiences and events etc. Section in-charge of the industry is requested to sign the daily diary at the end of the week and offer his comments about the initiative and participative attitude of trainee during training. Details about how to write daily diary will be provided by the institute.
- Attendance record of each trainee may please be kept in the industry. Absence without permission may please be communicated to the Polytechnic.
- Monitoring visits will be made by training and placement officer/faculty in-charge for the group of students, of the Polytechnic during training.