



Cusrow Wadia Institute of Technology

Pune – 411 001

Electrical Engineering Department

Mul ti Point Entry and Credit System 2014

(MPECS 2014)

CURRICULUM

[W.E.F. JUNE - 2014]

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE-1
ELECTRICAL ENGINEERING DEPARTMENT
REVISED CURRICULUM - 2014

ACKNOWLEDGEMENT

We would like to extend our sincere gratitude towards the following experts from various fields for their valuable suggestions and time to time help during revision of our curriculum, MPECS- 2014 for Diploma in Electrical Engineering.

<u>Sr.No.</u>	<u>Name of the expert</u>	<u>Organization</u>
1	Mr.D.J.Doke	Chairman Courses Committee
2	Mr.S.D.Khare	Member Courses Committee
3	Mr. V.V.Joshi	Member Courses Committee
4	Mr. M.M.Kolhatkar	Member Courses Committee
5	Mr. Charudatta Patil	Infinity Engg. Co., Shaniwar Peth, Pune
6	Mr. D.A.Katare	HOD, Elect. Engg. Deptt., Govt. Polytech.Pune.
7	Mr. C.Y. Totewar	Govt. Polytechnic, Pune.
8	Mr. S. T. Pise	Govt. Polytechnic, Pune.
9	Mr. M.A.Chaudhary	Ex. HOD, Govt. Polytechnic, Pune
10	Mr.U.B.Sarode	PVG's College Of Engg. ,Parvati,Pune.
11	Mr.M.P.Bhawalkar	PVG's College Of Engg. ,Parvati,Pune.
12	Mrs. V.S. Galgali	Modern Education Society's C.O.E. ,Pune
13	Mr. Parag A.Hore	Thermax Babcox and Wilcox Energy Solutions Pvt. Ltd., Pune.
14	Mr.A.D.Paranjpe	Tata Power Co. Ltd., Mumbai.
15	Mr. A.Y.Mehendale	MEDA, Yerwada, Pune.
16	Mr.Venkat Chintham	V-Mag Automation Systems Pvt Ltd.adapsar, Pune
17	Mr.Malviya Jaideep	Consultant, Solar Energy System,Pune.
18	Mr.Mahesh Gorwadkar	Godrej Lawkim ,Chakan ,Pune.

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19	Mr.Milind Kate	Suzlon India, Chakan, Pune
20	Mr. D.M.Tagare	Madhav Capacitor Pvt. Ltd, Bhosari, Pune.
21	Mr. Rajendra Joshi	Adroit Autotech, Karve Nagar, Pune.
22	Mrs. S.D. Joshi	PES's Modern College Of Engg. , Pune.
23	Mrs. P.P.Khatavkar	PES's Modern College Of Engg. , Pune.
24	Mr.Londhe P.S.	PES's Modern College Of Engg. ,Pune.
25	Ms.Pallavi S.Jadhav	PES's Modern College Of Engg. ,Pune.
26	Mr.D.K.Joshi	PES's Modern College Of Engg. ,Pune.
27	Mr.A.P.Redekar	PES's Modern College Of Engg. ,Pune.
28	Dr.P.B.Karandikar	AIT, Dighi, Pune.
29	Mrs. A.D. Shiralkar	AISSMS's Institute of Information Technology Pune.
30	Mr.S.M. Chaudhary	AISSMS's Institute of Information Technology Pune.
31	Mrs. S. R. Lengde	AISSMS's College Of Engg. ,Pune.
32	Mr.K.R.Gaikwad	Pimpri- Chinchwad Polytechnic, Pune.
33	Mr. Omprakash Barude	Bageshree Instrumentation and automation, Kharghar, Navi Mumbai.
34	Mr. Pritam Wani	PCMA Engineers, Process Control & Machine Automation, Chinchwad, Pune-19
35	Ms. Bhayashree Patil	Analogic Automation Pvt., Ltd. Narhe, Pune
36	Mr. Anant Jadhav	FIAT company,Pune.
37	Mr. Shingnath	M.S.E.D.C.L. , Lonikand , Pune.
38	Mr.N.A.Kulkarni	Zeal's College Of Engg. ,Pune.
39	Mr.Nilesh Dighe	Electrical Contractor, Pune
40	Mr.Parlikar A.M.	Irrigation Deptt. Govt. of Maharashtra.

CURRICULUM REVISION (2014)

1. Preamble :

- Cusrow Wadia Institute of Technology, Pune was granted Academic Autonomy in the year 1985 by Government of Maharashtra vide letter No. PTI 2483/119915(234)/TE-I (B) dated 27/2/1985.
- Initially the Institute adopted the Model Curriculum prepared by then TTTI, Western Region, Bhopal. Subsequently, the revisions in the curriculum were made as per the needs of the Society.
- The Institute adopted Multi Point Entry and Credit System w.e.f. June 1998.
- The earlier revision was carried out in the year 2004 . Subsequently the review of the curriculum was taken in the year 2007-2008. Necessary changes in the contents and detailing of the document as regards to the scope implementation strategy and related processes were done in the year 2008.
The present curriculum will come into force w.e.f. June 2014 .
- The feedback was taken from various stake holders and it was strongly felt that the rapid strides in the field of Information Technology, Computers and Manufacturing Processes , a dynamic curriculum need to adopt the benefits of the fast changing expectations in the contents as well as the Teaching Learning Methodology.
- The Institute has strengthened the hardware and software which is constantly consolidated and upgraded to match the needs of the society in general and the Industries in particular.
- Students should be proficient in the use of computers and related software irrespective of the branch of Engineering they are studying. The students shall be made to make maximum use of software packages and use Internet to derive and update their knowledge.
- The contemporary needs of the user system and overall development of the students is the governing factor in the revision of 2014 curriculum.

2. Approach for Curriculum Revision:

- Scientific system approach has been adopted in the revision of curriculum.
- A curriculum revision model showing various steps undergone is presented.

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- Analysis of the existing curriculum was done by taking feedback from the faculty implementing the curriculum, Alumni, Industry / Field Personnel, Courses Committee Members and the Experts in the field of Education.
- Entry behavior of the students was assessed. Basic entry qualification for Diploma is SSC or equivalent .However, higher entry qualification like 12th Science, 12th MCVV, ITI etc. was also considered.
- Curriculum documents of MSBTE, other Boards and other Autonomous Institutions were studied for inclusion of new courses and analysis of contents of existing and newly inducted courses and also the implementation strategy.
- The curriculum is rationalized as per the AICTE and MSBTE norms and guidelines.
- The team members were identified for conducting Search Conference, collecting feedback from stake holders and interviews with Experts for noting the suggestions about the courses and necessary modifications. The Interactive Sessions were arranged through Search Conference attended by the Experts from Industry and Academia. The faculty members were trained by specialists in Technical Education System as regards to the Curriculum Revision Process.

3. Roles to be played and functions to be performed by a diploma holder:

- A Diploma holder may be employed in the Industry as a Technician or Supervisor for Production, Installation, Repairs and Maintenance. He also may be employed in drawing, estimation or as an Assistant in IT related activities. He may be an Entrepreneur, be assigned a job of Purchase/ Marketing Department. Diploma holder should have basic knowledge of the various subjects of his branch in Engineering and also the related Inter-disciplinary subjects. He should be aware of the present technologies and be able to adopt the changes in future. He shall acquire the necessary skill sets in the Engineering subjects.
- His role in the Society is that of a responsible individual and should conduct himself as regards the values and cultures. He should acquire the necessary professional, presentation and managerial Skills.

4. Analysing job functions and deriving curriculum objectives:

- The role of a Diploma holder, as a Technician on the job, is analyzed in four Domains of Professional Skills, Life Long Learning, Personal Development and Social Development.
- The curriculum should help the students to acquire professional skills and inculcate attitudes in order that the student will be able to discharge the role and functions effectively on the society and employment front.
- Goals and objectives of each program were framed. The courses common to several programmes and the courses relevant to particular programmes were classified under various categories.
- The overall course structure and Teaching Examination Scheme was prepared.
- The contents of various courses were finalized by considering the feedback from stake holders through interviews, Search Conference and discussions.
- The course structure and the contents were validated by the Board of Studies.
- Study of the Diploma programmes offered by MSBTE, other State Boards and other Autonomous Institutions was done to widen the perspective.

5. Evolving the teaching learning process:

The following points were considered:

- No. of weeks – 16
- Average days per week- 5.5
- No. of contact hours per day – 7
- No. of hours per week for instruction and pre-decided Co-curricular activities – 38.
- Each course shall be taught for sixteen weeks and two weeks shall be utilized for revision in that term.

6. Course Categories:

- Foundation(1)
- Allied(2)
- Core(3)
- Applied(4)
- Specialized(5)

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- Number of courses for a programme :- 39
- Number of courses for award of class: - 11
- Number of Elective courses :- 3
- Number of credits to be earned for obtaining Diploma :- 185
- One credit = one hour of lecture / practical per week for a course.
- Ratio of theory to practical hours per week : approx. 50:50

7. Examination Scheme:

- Theory paper :- 80 marks
- Tests :- 20 marks
- Term Work :- 25-50 marks
- Practical :- 25-50 marks
- Viva voce :- 25- 50 marks
- Project Work :- 100 marks
- Grand total :- 4700 marks
- Grand total of marks for award of class: - 1600 marks

8. Course-wise content detailing:

- For finalization of course structure from Courses Committee, Examination Committee and Board of Studies, various processes in the Curriculum Revision Model were followed. Also the documents of MSBTE and Autonomous Polytechnics were referred.
- Contents were decided by taking into consideration, the expectations of the stake holders, specific needs of Industry, Interviews, Discussions and Experts opinions.
- Every course has a unique code e.g. R14EE3301. 'R14' means the course is from the curriculum revised in 2014. EE implies Electrical Engineering Department will teach this course. '3' indicates that it is Core Course Category in the programme structure. '3' means the course is to be taught to Electrical Engineering Programme. '01' is the serial number of the course in Core Courses Category.

The 7th character in the above 9 digit code is assigned for the programme ,e.g. 1 – Civil, 2 – Mechanical, 3 – Electrical, 4 – Computer and 5 – Electronics & Telecommunication

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Engineering and 7 – Common courses for all programs taught by Science Department.

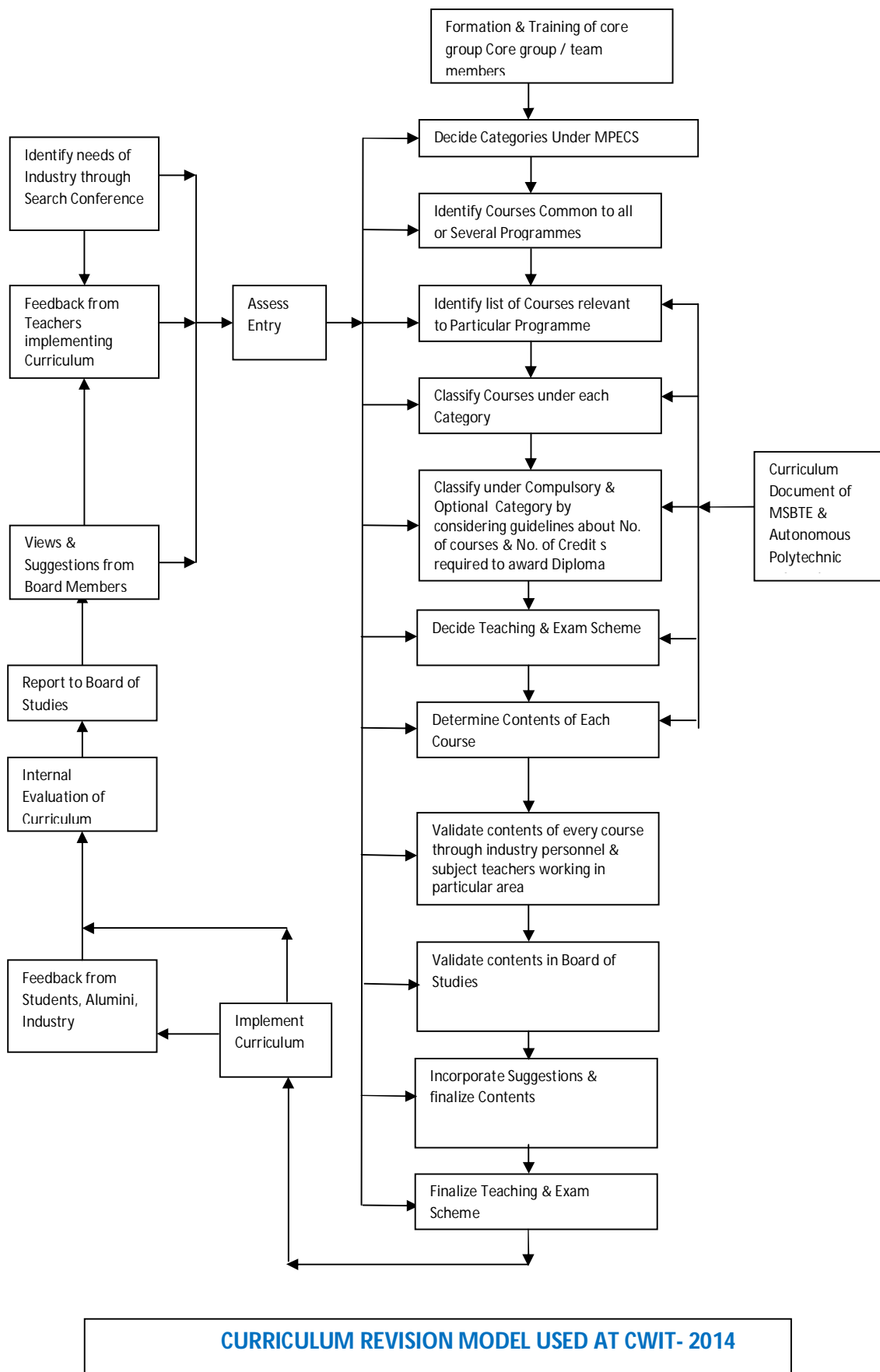
- A rationale giving the importance of the course in the curriculum is vividly explained. The course objectives are derived indicating the purpose to teach the course / subject.
- The Practicals, Seminars are spelt out along with assessment technique.
 - The input for professional practices and generic skills are included in most of the courses so that the students will be able to learn the contents beyond syllabus.
 - The curriculum document prescribes learning resources for students e.g. Reference books, Textbooks, Websites, Handbooks, Printed notes etc.
 - Use of Learning Management System, Audio Visual Aids be increased for enhancing the Teaching Learning Process.

9. Curriculum implementation strategy:

- Members of the faculty shall continuously undergo Induction Training Programme, Content upgrading programme conducted by ISTE , NITTTR and other Organizations.
- The faculty members will be deputed to attend Refresher courses and Training programmes so as to help them keep abreast with latest developments and technology.
- Faculty members will be trained in respect of various aspects and methods of evaluation systems, Paper setting etc.
- Faculty will be trained for monitoring the curriculum implementation.
- Library will be constantly modernized with additions of latest titles and books .The Library will have open access to the students. Library will be open for extended hours from 10 a.m. to 8.00 p.m. The Books Bank Facility will support the demand of the students.
- The Laboratory and Field Manuals will be structured and standardized so that the students can spend more time for doing practicals, understanding the significance, discussions and result analysis rather than only writing the journals.
- The Examination rules will be revised to suit the curriculum and will have similarity as regards to principles followed by MSBTE and other Examination bodies.

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- The Evaluation Systems and marking schemes will be commensurate with the input hours and importance of the topics in the course.
- 24 X 7 Internet connection is available for faculty, staff and students . Also Wi-Fi connectivity provided in all classrooms and laboratories will support the modern methods of teaching.
- Uninterrupted Power Supply and captive power is made available to take over the load shedding.
- The laboratories, equipments and computers be maintained in working conditions. The models, charts and exhibits be displayed to invite attention of the students.
- Industrial visits, Field visits, Study tours shall be arranged regularly in a preplanned and structured manner so as to have focus on technical aspects.
- Guest faculty should be invited to deliver lectures on recent trends, technology, materials and processes. These activities be planned in the beginning of the term. The students should imbibe various life skills, generic skills, learn stress management and adjust help and appreciate colleagues especially during group activities, study tours and visits etc.



**ABOUT DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME**

A diploma holder in Electrical Engineering is generally employed in industry, in middle management level as a supervisor, in production or maintenance department depending upon the type of organization.

In more sophisticated Electrical Engineering Industry, he has to work as a technician in research & development department or involved in testing of the product as per relevant standard.

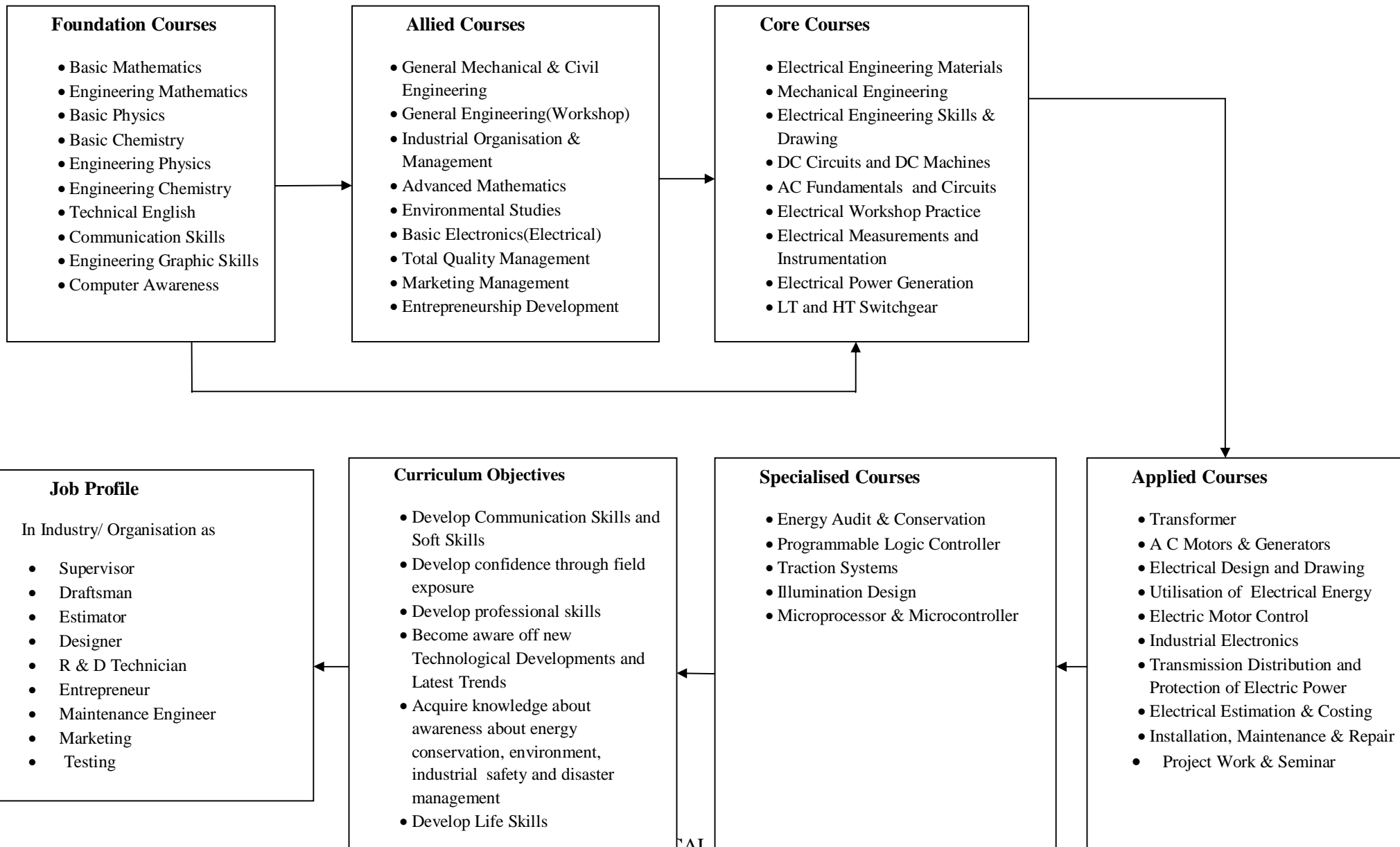
In power sector establishment engaged in transmission & distribution of power, he has to prepare estimate & supervise the work done by workers.

As an entrepreneur he can start his own establishment as an electrical installation, electrical maintenance contractor requiring various skills & abilities in addition to skills & abilities required by employed electrical engineers.

The real description of the job profile is complex & while designing the curriculum the requirement of representative industry & organization are to be considered understanding the role of middle management level supervisor.

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DIPLOMA PROGRAMME IN ELECTRICAL ENGINEERING – MPECS 2014



CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

PROGRAMME: ELECTRICAL ENGINEERING DEPARTMENT

SCHEME : MPECS 2014

Sr. No	Category		Course Code	Course Title	Pre-Requisite	C/O	Teaching Scheme		CR	Examination Scheme					
							L	P		TH	TT	PR	OR	TW	Total
1	Foundation Courses	1	R14SC 1701	Basic Mathematics	-	C	4	-	4	80	20	-	-	-	100
2		2	R14SC 1702	Engineering Mathematics	-	C	4	-	4	80	20	-	-	-	100
3		3	R14SC 1703	Basic Physics	-	C	2	2	4	40	10	-	-	25	75
4		4	R14SC 1704	Basic Chemistry	-	C	2	2	4	40	10	-	-	25	75
5		5	R14SC 1707	Technical English	-	C	2	2	4	80	20	-	-	25	125
6		6	R14SC 1708	Communication Skills	-	C	1	2	3	-	-	-	25@	25	50
7		7	R14SC1709	Applied Science	-	C	4	4	8	80	20	-	-	50	150
8		8	R14ME1202	Engineering Graphic Skills	-	C	2	4	6	-	-	-	-	50	50
9		9	R14ME1206	Computer Awareness	-	C	1	4	5	-	-	25@	-	50	75
Total							22	20	42	400	100	25	25	250	800
10	Allied Courses	1	R14ME2201	General Mechanical & Civil Engineering	-	C	2	4	6	-	-	-	-	50	50
11		2	R14ME2202	General Engineering (Workshop)	-	C	1	2	3	-	-	-	-	50	50
12		3	R14ME2203	Industrial Organization & Management	-	C	3	-	3	80	20	-	-	-	100
13		4	R14SC2701	Advanced Mathematics	-	C	3	-	3	80	20	-	-	-	100
14		5	R14EE 2301	Environmental Studies	-	C	2	1#	3	-	-	-	25@	25	50
15		6	R14EX2501	Basic Electronics (Electrical)	-	C	4	2	6	80	20	-	-	25	125
16		7	R14ME2204	Total Quality Management	-	Any one	2	1	3	-	-	-	25@	25	50
17		8	R14EE2302	Marketing Management	-		2	1	3	-	-	-	25@	25	50
18		9	R14ME2205	Entrepreneurship Development	-		2	1	3	-	-	-	25@	25	50
Total							17	10	27	240	60	-	50	175	525
19	Core Courses	1	R14EE3301	Electrical Engineering Materials	-	C	3	-	3	80	20	-	-	-	100
20		2	R14ME3302	Mechanical Engineering	R14ME2201	C	3	2	5	80	20	-	-	50	150
21		3	R14EE3303	Electrical Engineering Skills & Drawing	-	C	-	4	4	-	-	-	25@	50	75
22		4	R14EE3304	DC circuits and DC Machines	-	C	4	2	6	80	20	25@	-	50	175
23		5	R14EE3305	AC Fundamentals and circuits	-	C	4	2	6	80	20	50	-	50	200
24		6	R14EE3306	Electrical Workshop Practice	-	C	3	2	5	80	20	-	-	50	150

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25		7	R14EE3307	Electrical Measurements & Instrumentation	-	C	4	2	6	80	20	50	-	50	200	
26		8	R14EE3308	Electrical Power Generation	-	C	4	2	6	80	20	-	25@	50	175	
27		9	R14EE 3309	L.T. and H.T. Switch Gear	-	C	4	2	6	80	20	-	25	25	150	
Total								29	18	47	640	160	125	75	375	1375
28	Applied Courses	1	R14EE4301	Transformer	R14EE3305	C	4	2	6	80	20	50	-	25	175	
29		2	R14EE4302	A.C. Motors & Generators	R14EE3305	C	4	2	6	80	20	50	-	50	200	
30		3	R14EE4303	Electrical Design & Drawing	R14EE3303	C	-	2	2	-	-	-	50	25	75	
31		4	R14EE4304	Utilization of Electrical Energy	-	C	3	-	3	80	20	-	-	-	100	
32		5	R14EE4305	Electric Motor Control	R14EE3304	C	4	2	6	80	20	-	50	25	175	
33		6	R14EX4306	Industrial Electronics	R14EX2501	C	4	2	6	80	20	-	-	50	150	
34		7	R14EE4307	Transmission, Distribution & Protection of Elect. Power	R14EE 3309	C	4	2	6	80	20	-	50	50	200	
35		8	R14EE4308	Electrical Estimation & Costing	R14EE3306	C	4	2	6	80	20	-	50	50	200	
36		9	R14EE4309	Installation, Maintenance & Repair	-	C	4	2	6	80	20	-	-	25	125	
37		10	R14EE4310	Project Work & Seminar	100CR	C	-	4	4	-	-	-	50	100	150	
Total								31	20	51	640	160	100	250	400	1550
38	Specialized Courses	1	R14EE5301	Energy Audit & Conservation	-	Any Three	4	2	6	80	20	-	25	25	150	
39		2	R14EE5302	Programmable Logic Control	-		4	2	6	80	20	-	25	25	150	
40		3	R14EE5303	Traction Systems	-		4	2	6	80	20	-	25	25	150	
41		4	R14EE5304	Illumination	-		4	2	6	80	20	-	25	25	150	
42		5	R14EE5305	Microprocessor & Microcontroller	-		4	2	6	80	20	-	25	25	150	
Total								12	6	18	240	60	-	75	75	450
Total of Marks=4700 ; Credits = 185								111	74	185	2160	540	250	475	1275	4700
GRAND TOTAL								4700								

@ =Internal Orals , #= Tutorial

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

PROGRAMME: ELECTRICAL ENGINEERING DEPARTMENT

SCHEME: MPECS 2014

Summary of Credits & Marks

Course	Teaching Scheme		CR	Examination Scheme				
	L	P		WE	TT	PR	OR	TW
Foundation Courses	22	20	42	400	100	25	25	250
Allied Courses	17	10	27	240	60	-	50	175
Core	29	18	47	640	160	125	75	375
Applied Courses	31	20	51	640	160	100	250	400
Specialized Courses	12	6	18	240	60	-	75	75
Total	111	74	185	2160	540	250	475	1275
				2700		2000		
Grand Total	185			4700				

Total Courses = 38

The total no. of courses to be completed = 34 (Compulsory) + 4 (Optional)

The no. courses having theory exam = 28

The no. Practical/ Oral examination = 07 Internal + 13 External

Credits Ratio Theory: Practical = 60 : 40

Marks Ratio Theory: Practical = 57 : 43

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN ELECTRICAL ENGINEERING SCHEME FOR CLASS DECLARATION: MPECS 2014

Sr. No.	Category		Course Code	Course Title	Pre-requisite	C/O	Teaching Scheme		CR	Examination Scheme				
							L	P		WE	TT	PR	OR	TW
1	Core courses	1	R14EE3309	L.T. and H.T. Switch Gear	-	C	4	2	6	80	20	-	25	25
2	Applied courses	2	R14EE4302	A.C. Motors & Generators	R14EE3305	C	4	2	6	80	20	50	-	50
3		3	R14EE4304	Utilization of Electrical Energy	-	C	3	-	3	80	20	-	-	-
4		4	R14EE4305	Electric Motor Control	R14EE3304, R14EE4302	C	4	2	6	80	20	-	50	25
5		5	R14EE4303	Electrical Design & Drawing	R14EE3303	C	-	2	2	-	-	-	50	25
6		6	R14EE4309	Installation, Maintenance & Repair	-	C	4	2	6	80	20	-	-	25
7		7	R14EE4310	*Project Work & Seminar	100CR	C	-	4	4	-	-	-	50	100
8		8	R14EE4301	Transformers	R14EE3305	C	4	2	6	80	20	50	-	25
9	Specialized courses	1	R14EE5301	Energy Audit & Conservation	Any Three	O	4	2	6	80	20	-	25	25
10		2	R14EE5302	Programmable Logic Control		O	4	2	6	80	20	-	25	25
11		3	R14EE5303	Traction Systems		O	4	2	6	80	20	-	25	25
12		4	R14EE5304	Illumination		O	4	2	6	80	20	-	25	25
13		5	R14EE5305	Microprocessor & Microcontroller		O	4	2	6	80	20	-	25	25
Total							36	22	58	720	180	100	250	350

COURSES FOR CLASS DECLARATION

The maximum theory marks = 900
 The maximum practical marks = 700
 Theory credits: Practical credits ratio = 62: 38
 Theory marks: Practical marks ratio = 56: 44

CLASS DECLARATION = 1600

Total no. of theory courses = 09
 Total no. of practical/ oral courses = 09

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

PROGRAMME: DIPLOMA IN ELECTRICAL ENGINEERING

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SR. NO.	CATEGORY	COURSE CODE	COURSE TITLE	PAGE NO.
1	FOUNDATION COURSES	R14SC 1701	Basic Mathematics	
2		R14SC 1702	Engineering Mathematics	
3		R14SC 1703	Basic Physics	
4		R14SC 1704	Basic Chemistry	
5		R14SC 1707	Technical English	
6		R14SC 1708	Communication Skills	
7		R14SC1709	Applied Science	
8		R14ME1202	Engineering Graphic Skills	
9		R14ME1206	Computer Awareness	
10	ALLIED COURSES	R14ME2201	General Mechanical & Civil Engineering	
11		R14ME2202	General Engineering (Workshop)	
12		R14ME2203	Industrial Organization & Management	
13		R14SC2701	Advanced Mathematics	
14		R14EE 2301	Environmental Studies	
15		R14EX2501	Basic Electronics (Electrical)	
16		R14ME2204	Total Quality Management	
17		R14EE2302	Marketing Management	
18		R14ME2205	Entrepreneurship Development	
19	CORE COURSES	R14EE3301	Electrical Engineering Materials	
20		R14ME3302	Mechanical Engineering	
21		R14EE3303	Electrical Engineering Skills & Drawing	
22		R14EE3304	DC circuits and DC Machines	
23		R14EE3305	AC Fundamentals and circuits	
24		R14EE3306	Electrical Workshop Practice	
25		R14EE3307	Electrical Measurements & Instrumentation	
26		R14EE3308	Electrical Power Generation	
27		R14EE 3309	L.T. Switch Gear	

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PROGRAMME: DIPLOMA IN ELECTRICAL ENGINEERING

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SR. NO.	CATEGORY	COURSE CODE	COURSE TITLE	PAGE NO.
28	APPLIED COURSES	R14EE4301	Transformer	
29		R14EE4302	A.C. Motors & Generators	
30		R14EE4303	Electrical Design & Drawing	
31		R14EE4304	Utilization of Electrical Energy	
32		R14EE4305	Electric Motor Control	
33		R14EX4306	Industrial Electronics	
34		R14EE4307	Transmission, Distribution & Protection of Elect. Power	
35		R14EE4308	Electrical Estimation & Costing	
36		R14EE4309	Installation, Maintenance & Repair	
37		R14EE4310	Project Work & Seminar	
38	SPECIALIZED COURSES	R14EE5301	Energy Audit & Conservation	
39		R14EE5302	Programmable Logic Control	
40		R14EE5303	Traction Systems	
41		R14EE5304	Illumination Design	
42		R14EE5305	Microprocessor & Microcontroller	

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DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Basic Mathematics

Course Code: R14SC1701

Course Category: Foundation

Credits : 4

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
4	-	3	80	20	-	-	-	100

Rationale:

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The aim of the course is to acquire some essential competencies in Mathematics by the students of diploma in Engineering. The course will help the students to think logically and systematically. The students will develop the attitude of problem solving.

Objectives:

The students will be able to

1. Understand all the basic concepts of Mathematics used in various fields of engineering.
2. Know the methods and procedures of problem solving.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	<u>Trigonometry:</u> 1.1 Trigonometric ratios of an angle Definition of positive and negative angles. Unit of measurement of an angle. Signs of trigonometric ratios of an angle in the four quadrants.(ASTC RULE) Trigonometric ratios of negative angles. 1.2 Trigonometric ratios of compound angles. Trigonometric ratios of allied angles. Trigonometric ratios of multiple and sub-multiple angles. Factorization and de-factorization formulae.	15	16

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2	<p>Inverse Circular function</p> <p>2.1 Definition of inverse circular function. Principal value of inverse circular function. Properties of inverse circular function. Simple problems based on properties.</p> <p>2.2 Solution of triangle. Sine Rule. Cosine Rule. Solution of the triangle using sine and cosine rule.</p> <p>Determinant:</p> <p>2.3 Definition of determinants. Problems on expansion of determinants of order 2 & 3. Solution of simultaneous equation in two and three unknowns (Cramer's Rule).</p>	10	12
3	<p>Matrices:</p> <p>3.1 Definition of a Matrix. Types of Matrices. Algebra of matrices: Addition, subtraction and multiplication of matrices.</p> <p>3.2 Transpose of a matrix. Cofactor matrix Adjoint of a matrix.</p> <p>3.3 Inverse of a matrix and to find inverse by adjoint method. Solution of simultaneous equation by matrix method.</p>	10	16
4	<p>Statistics:</p> <p>4.1 Measures of central tendency. Mean, Median and Mode for grouped and ungrouped data.</p> <p>4.2 Measures of dispersion: Mean deviation. Standard deviation. Variance and coefficient of variation</p>	10	12
5	<p>Vector Algebra:</p> <p>5.1 Definition of Vector. Addition, subtraction of vectors. Direction cosines, direction ratios of line.</p> <p>5.2 Product of vectors and its properties: Dot product of vectors Cross product of vectors. Scalar triple product of vectors.</p>	09	12
6	<p>The Straight Line:</p> <p>6.1 Slope and intercept of a line.</p>	10	12

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	Parallel and perpendicular lines. 6.2 Intersection of two lines. Acute angle between two lines Perpendicular distance between a point and a line. Distance between two parallel lines. 6.3 Graphs - Graph of linear function. Graph of quadratic equation. Graph of trigonometric function. Graph of exponential function.		
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Teaching Methodology: Chalk board, Discussion, Assignments, Printed notes

Skills to be developed:

Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Calculation skill will be developed after studying the topics Trigonometry ,Determinants and Matrices
- Skill of drawing graphs will be developed after studying the topic graphs.

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Learning Resources:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Peter V. O'Neil	Advanced Engineering Mathematics	Thomson, Canada.
2	K. A. Stroud, D. J. Booth	Engineering Mathematics	Palgrave, New York, U.S.A.
3	S. L. Loney	Plane Trigonometry	Macmillan Publication

A) Books :

B) Websites for references:

1. www.Wikipedia.com
2. www.Wolfarm.com
3. www.Mathworld.com
4. www.nptel.iitm.ac.in

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DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Engineering Mathematics
Course Category: Foundation

Course Code: R14SC1702
Credits : 4

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
4	-	3	80	20	-	-	-	100

Rationale:

Mathematics is an important prerequisite for the development and understanding of engineering concepts. The subject intends to teach students basic facts, concepts and principles of Mathematics as a tool to analyze engineering problems. It also aims to teach students to apply the basic facts of Mathematics to solve engineering problem.

Objectives:

The students will be able to:

1. Understand the concept and principles of derivatives, functions, limits.
2. Use the principles of derivatives for the various applications.
3. Understand the principles of complex numbers.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	Functions and Limits: 1.1 Definition of functions and Notation. Different types of functions. 1.2 Limits - Concept of limits, Algebra of limits. 1.3 Different methods of finding limits. Limits of algebraic function. Limits of trigonometric function. Limits of exponential functions.	15	16
2	Laws of Derivative: 2.1 Concept and definition of derivative. 2.2 Derivatives of standard functions. 2.3 Laws of derivatives :- Addition law. Subtraction law. Multiplication law. Division law. 2.4 Derivatives of composite functions (Chain rule).	09	12
3	Methods of Derivatives: 3.1 Derivative of parametric functions.	10	12

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	Derivative of implicit functions. Logarithmic differentiation. 3.2 Concept of higher order derivative 3.3 Concept of partial derivative.		
4	Application of Derivatives: 4.1 Geometrical meaning of derivative.(slope of tangent and normal to the given curve) 4.2 Radius of curvature. 4.3 Physical application of derivative. 4.4 Maxima and minima using derivative.	9	12
5	Integration: 5.1 Definition of integration as anti-derivative. 5.2 Integration of algebraic functions. 5.3 Integration of trigonometric functions. 5.4 Integration by substitution.	9	12
6	Complex Number: 6.1 Definition of complex number. Algebra of complex number i.e. addition, subtraction, multiplication and division of complex numbers. To express given complex number in $x + iy$ form. 6.2 Representation of complex number in a plane (Argand's diagram). Modulus and amplitude of complex number. Polar form of a complex number. Exponential form of a complex number. 6.3 Powers of a complex number - De - Moivre's theorem. Euler's theorem.	12	16

Teaching Methodology: Chalk board, Discussion, Assignments, handouts

Skills to be developed:

Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Application skill will be developed after studying the topic Application of derivatives.
- Comprehension skill will be developed after studying each and every topic.

Learning Resources:

A) Books :

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	K. A. Stroud, D. J. Booth	Engineering Mathematics	Palgrave, New York, U.S.A.
3	Peter V. O'Neil	Advanced Engineering	Thomson, Canada.

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		Mathematics	
4	Shanti Narayan	Engineering Mathematics Vol. I & II	S.Chand & Company, New Delhi.

B) Websites for references:

1. www.wikipedia.com
2. www.wolfarm.com
3. www.mathworld.com
4. www.nptel.iitm.ac.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course Name : Basics Physics

Course Code: R14SC1703

Course category: Foundation

Credits : 4

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
2	2	2	40	10	-	-	25	75

Rationale:

The development of various engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the branches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can pursue his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field.

Objectives:

The student will be able to

1. Use different types of systems of units.
2. Identify and minimize the errors, Understand significant figures.
3. Study different types of motion and their applications in engineering field.
4. Study molecular forces and explain surface tension and viscosity with applications.
5. Understand different concepts of sound and ultrasonic waves with application.
6. Differentiate between conduction convection and radiation.
7. Use different types of thermometers.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
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1	<p>1.1 Units and measurements: Unit, fundamental units & examples, derived units & examples, system of Fundamental units (C.G.S., M.K.S., S.I. system of units) Rules and Conventions for the use of spacing of symbols in SI system. Table of derived S.I. units. Multiples and sub multiples of units. Significant figures, rules for significant figures.</p> <p>1.2 Errors. – Types of errors, Minimization of errors, Percentage error, Propagation of errors, Numericals.</p> <p>1.3 Surface Tension: Molecular forces and their nature, cohesive forces, adhesive forces sphere of influence, definition of surface tension, factors affecting surface tension (Temperature, impurity nature of the liquid), concave and convex meniscus of liquid surfaces and their explanation on the basis of molecular forces, angle of contact, capillary action and its explanation, applications of surface tension. Numericals</p> <p>1.4 Viscosity: Streamline and turbulent flow of fluids, critical velocity, viscous force in fluid, significance of Reynolds's number, velocity gradient, Newton's law, Stoke's law expression , terminal velocity, Numericals.</p>	14	16
2	<p>2.1 Circular Motion: Circular motion, uniform circular motion, tangential velocity, angular velocity, periodic time, frequency, relation between 1) Angular velocity and frequency, 2) angular velocity and periodic time, 3) linear velocity and angular velocity, radial acceleration expression, centripetal force, centrifugal force ,numericals.</p> <p>2.2 Applications of Circular Motion: Motion of a vehicle round a horizontal curve, banking of roads and tracks, expression for angle of banking and super elevation, centrifuge. numericals</p> <p>2.3 Simple Harmonic Motion: Periodic motion, simple harmonic motion, S.H.M. as a projection of uniform circular motion, equation of S.H.M. graphical representation of S.H.M. concepts of oscillation, periodic time, frequency, amplitude, phase, phase difference. Numericals.</p>	9	12

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3	<p>3.1 Modes of Heat Transfer, Temperature Measurement: Difference between heat and temperature, definition of calorie, absolute zero, units of temperature $^{\circ}\text{C}$, $^{\circ}\text{F}$, $^{\circ}\text{K}$ with their conversion</p> <p>a) Conduction – Flow of heat along a bar, steady state and variable state temp. Coefficient of thermal conductivity by Searle's method. (For good conductor) and Lee's method (for bad conductor).</p> <p>b) Convection,</p> <p>c) Radiation - Emissive power, absorptive power, black body, numerical Comparison between conduction, convection and radiation.</p> <p>3.2 Temperature Measurement: Bimetallic thermometer, resistance thermometer, thermocouple & thermopile, Pyrometers –</p> <p>i) Ferry's total radiation, ii) Optical Pyrometer.</p> <p>3.3 Sound: Sound waves, propagation of sound, reflection of sound waves, echo, absorption of sound, coefficient of absorption, reverberation, reverberation time, formula for reverberation time (No derivation), methods for controlling reverberation time. Numericals.</p>	9	12
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Teaching methodology: Chalk board, Group Discussions, Handouts, Question Bank, PPT,

Transparency, Seminar, and Guest Lecture.

Term work:

Skills to be developed:

i) Intellectual Skills:

- Identify skill will be developed after studying topics of Temperature measurement.
- Discriminating skill will be developed after studying topics on motion.
- Comprehension skill will be developed after studying concept, principles laws and rules given in the syllabus.

ii) Motor Skills:

- Measuring skill will be developed after completing practicals.
- Draw graph skill will be developed after studying practicals.
- Observing the result and comparison skill will be developed after competing practicals.

List of Experiments:

1. Measurement of (i) length, breadth and height of a block, (ii) internal, external diameter and height of a hollow cylinder using vernier calipers of different least counts and digital vernier.

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2. Measurement of diameter of sphere, wire and measurement of thickness of a plate by using micrometer screw gauge.
3. Measurement of radii of concave and convex surfaces and thickness of plate using spherometer.
4. To find viscosity of water by Poiseuille's method.
5. To find viscosity of oil by Stoke's method.
6. Calibration of thermocouple and to find unknown temperature.
7. Comparison of different thermometer with respect to mercury Thermometer.
8. To study the effect of length and mass of the bob on periodic time of a simple pendulum.
9. To investigate relation between radius and height of liquid in the capillary tube. (surface tension)
10. Determination of co-efficient of thermal conductivity of a good conductor by Searle's method.
11. Determination of co-efficient of thermal conductivity of a bad conductor by Lee's disc method.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	R.K.Gaur, S.L.Gupta	Engineering Physics	Dhanput Raj Publications.
2	Prof. M. P. Kurian, Prof. R. B. Birkhade, Prof.A.A.Mokashi	Applied Physics	Reliable Publications.
3	Dr.A.P.Saxena & Others	Principles of Physics	J.K.Jain Brothers TTTI, Bhopal.
4	Kamat & Rao	Applied Physics	Jeevan Deep Prakashan.
5	Mrs.V.C.Chinchwadkar	Text Book in Physics	Somaiya Publications, Bombay.
6	Umrani, Joshi	Applied Physics	Nirali Prakashan.

B) Web sites for references:

1. www.physicsclassroom.com
2. www.hyperphysics.com
3. www.physicsinfo.com

C) Video

www.Youtube.com (surface tension, viscosity, sound, ultrasound)

1. PPT 1. www.khanaacademy.com 2. www.slideshare.net

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./E&TC. ENGINEERING

Course : Basic Chemistry

Course Code: R14SC1704

Course Category : Foundation

Credits : 4

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
2	2	2	40	10	-	-	25	75

Rationale:

Basic sciences like Chemistry are the foundation pillar of engineering and technology .It is most essential to learn the basic science to understand the fundamental concepts of engineering and technology.

The topic of Atomic structure and Chemical bonding is helpful to study properties of elements which are required in the engineering field.

In Electrochemistry electrical energy is obtained from the different chemical reactions which are used in different types of batteries. These batteries are widely used in automobiles and in day to day life.

Metallurgy and alloys have importance in various Industries , because metals are the backbone of the Industry. Study of properties of Metals and Alloys is essential

Non-metallic materials such as plastic and rubber have great importance and application in technology.

Objectives:

The student will be able to

- 1) After studying the atomic structure and chemical bonding student will be able to draw the electronic configuration of various elements with the formation of various types of molecules.
- 2) With the study of electrochemistry student will be able to know electrolysis, Faraday's laws and working of different batteries.
- 3) After study of Metals and alloys student will be understand properties and applications of various Metals and alloys used in engineering industries.
- 4) After studying the non-metallic material student will be able to know the different properties and current applications of plastic and rubber in the engineering field.

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	Atomic Structure and Chemical Bonding: 1.1 Atom , Bohr's atomic model (postulates) Fundamental particle of atom, their Mass,	09	12

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	<p>Charge, Locations,</p> <p>1.2 Atomic number, Mass number, Isotopes and Isobars,</p> <p>1.3 Hund's rule of maximum Multiplicity, Pauli's Exclusion Principle ,Aufbau principle,</p> <p>1.4 Electronic configuration, Octet rule & Duplet rule. (Electronic configuration upto Atomic number 30).</p> <p>1.5 Types of Chemical bond, Electrovalent, Covalent, Formation and structure of Electrovalent molecules such as NaCl, CaCl₂,AlCl₃ etc</p> <p>1.6 Covalent compounds such as H₂O, Cl₂, O₂, NH₃, N₂ etc</p> <p>1.7 Distinction between Electrovalent and Covalent compounds.</p>		
2	<p>Electrochemistry</p> <p>2.1 Definitions of basic terms involved in Electrolysis: Conductors, Non conductors, Electrolytes: Strong and Weak Electrolyte, Difference between strong and weak electrolyte, Non electrolytes, Electrolysis, Electrolytic cell, Current density.</p> <p>2.2 Ionization, Electrolytic Dissociation, Arrhenius theory of degree of Ionization /Dissociation and Factors affecting the Degree of Ionization. Definition of electrolytic cell, Electrodes -Cathode and Anode , Electrode potential – Oxidation potential and Reduction potential</p> <p>2.3 Mechanism of Electrolysis, Electrolysis, Electrochemical series for Cations and Anions , Electrolysis of CuSO₄ solution using Platinum electrodes & Copper electrodes</p> <p>2.4 Applications of Electrolysis: Electroplating of Silver, Electro refining of blister Copper , Electrometallurgy</p> <p>2.5 Electrochemical Processes: Faradays laws of Electrolysis (1st and 2nd law), Relation between ECE and CE. Numerical problems ,</p> <p>2.6 Electric Cells and Battery , Types of Cells :</p>	10	12

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	Primary and Secondary cells, Construction & Working of dry cell.		
3	<p align="center">METALS & ALLOYS</p> <p align="center">a. Metals</p> <p>3.1 Introduction , Characteristics of Metals, Definitions – Mineral , ore, Gangue, flux and Slag, Metallurgy</p> <p>3.2 Metallurgy- flow chart for extraction of metal</p> <p>3.3 Important Extraction Process- Concentration- Gravity Separation, Electromagnetic separation , Froth flotation Process, Calcinations and Roasting. Reduction – Smelting , Aluminothermic Process ,Electrolytic reduction. Refining-Poling, Liquation, Electrolytic refining .</p> <p>3.4 Mechanical Properties of Metals: Hardness , Ductility, Malleability, Tensile strength, Toughness ,Machinability , Weldalibity, Forging, Soldering, Brazing , Castability.</p>	9	10
	<p align="center">b. Alloys</p> <p>3.5 Definition, Purposes of Making Alloy with examples. Preparation Method – Fusion and Compression Classification of Alloys – Ferrous and Non Ferrous alloys with examples.</p> <p>3.6 Composition , Properties and Applications of Duralumin , Wood metal, Babbit metal, Monel metal ,Brass</p> <p>B) NON METALLIC ENGINEERING MATERIALS</p> <p>3.7 Polymers, Definition of polymer (plastic) Polymerization , Types of polymerization with examples.</p> <p>3.8 Types of Plastic – Thermo-softening and Thermo- setting plastic and their differences , Properties and Applications of plastic.</p> <p>3.9 Rubber: Definition ,Types of rubber, Drawbacks of natural rubber, Vulcanization of rubber with chemical reaction , Synthetic rubber- Definition , differences between Natural and synthetic rubber,</p>	04	06

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	Examples of synthetic rubber, Properties of synthetic rubber like Elasticity, Tack and Abrasion resistance, Their definition and applications		
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Teaching Methodology: Chalk board, Discussion, Assignments, Handouts and Question Bank, moodle.

Term work

Skills to be developed:

i) Intellectual Skills:

- Understand the concept of Construction & working of different batteries.
- Calculation of C.E. and E.C.E

List of Practical's/Experiments

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

- 1) Know your Chemistry laboratory and prepare sample solutions of different concentrations.
- 2) Drawing of Electronic configuration of atoms from atomic number 1 to 30 & Draw the molecular structure of various electrovalent and covalent compounds.
- 3) To determine Alkalinity of a given Water sample.
- 4) To determine the Neutralization point of weak acid and weak base using Conductivity Meter.
- 5) To determine the ECE of copper by Electrolysis of CuSO_4 solution.
- 6) Determination of percentage purity of Iron from stainless steel alloy
- 7) To determine percentage of Copper from the brass.

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- 8) To determine percentage of Nickel from given Monel metal alloy.
- 9) To determine phosphate in a given water sample by using spectrophotometer.
- 10) To draw the Flow sheet of extraction of Metal form it's ore.
- 11) Precipitation titration of BaCl_2 with H_2SO_4 using Conductivity meter.
- 12) Prepare Phenol formaldehyde resin used in manufacturing of Bakelite plastic

Learning Resources

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	V.P .Mehta	Polytechnic Chemistry	Jain brothers , New Delhi
2	Sharma B.K. & Kaur H.	Industrial Chemistry	Goel Publishing House, Meerut.
3	Jain P.C. & Jain Monika	Engineering Chemistry	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
4	S.S. Dara	Engineering Chemistry	S. Chand Publication

B) Web site for references:

1. www.in.wikipedia.org
2. www.nptel.iitm.ac.in
3. [www.youtube.com, watch v= KjoQHqzda8](http://www.youtube.com/watch?v=KjoQHqzda8) (related to Chemical bonding)

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Technical English

Course Code: R14SC1707

Course Category: Foundation

Credits : 4

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
2	2	3	80	20	-	-	25	125

Rationale:

Students need effective writing skill in their academic and professional life. This syllabus is need based and special efforts are taken to improve the writing skills of students. Students admitted to polytechnic come from rural and urban areas. They are from different mediums and backgrounds. As the students are weak in writing correct English, more stress is given on improving their basic concepts of written communication.

Objectives:

The students will be able to

1. Learn the basic concepts of grammar and sentence formation.
2. Express their ideas logically and correctly.
3. Comprehend the given passage and arrange their ideas in sequential order.
4. Improve their presentation skills in oral and written communication.
5. Interact effectively from the industry point of view.
6. Use the various formats of business correspondence.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	Grammar: 1.1 Parts of Speech. 1.2 Transformation of sentences. [tenses, prepositions, conjunctions, punctuation, direct-indirect speech, active & passive voice] 1.3 Features of technical writing.	8	16
2	Communication: 2.1 Written and oral communication. 2.2 Barriers in communication. 2.3 Principles of communication	4	12
3	Applied Writing: 3.1 Dialogue writing	4	12

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	3.2 Comprehension. 3.3 Speech writing on : - Farewell speech - Introducing a guest -Vote of thanks		
4	Office Drafting: 4.1 Notice and Circular. 4.2 Memo. 4.3 Email writing.	4	12
5	Business Correspondence: 5.1 Letter of Enquiry, Order and job application. 5.2 Letter of Complaint, resignation, reminder. 5.3 Joining letter, appreciation letter.	8	16
6	Report writing: 6.1 Visit report. 6.2 Accident report. 6.3 Progress report, Investigation report.	4	12

Teaching Methodology: Chalkboard, white board, improved lecture method, discussion method,
power point Presentations, case study.

Term work: Skills to be developed:

i) Intellectual Skill:

- Speaking and listening skills will be developed on completion of the assignment nos.7-12 of term work.
- Presentation skills will be developed on performance of assignment nos.1-6 of term work.
- Writing skills will be developed by studying topics of applied writing, Office drafting, Business correspondence and Report writing.
- Reading and comprehension skills will be developed by studying the topic of Comprehension.

ii) Skills to be developed in Professional practices are included in these assignments.

List of Practical/Assignment/Experiment:

1. Self introduction. (Professional Practices)
2. Technical presentation. (Professional Practices)
3. Elocution. (Professional Practices)
4. Power Point presentation. (Professional Practices)
5. Email Writing.
6. News Presentation. (Professional Practices)

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7. Introduction of Basic English words and their pronunciation.
8. Introduction of friend, guest, visitors.
9. Meeting and greeting people.
10. Talking about the family.
11. Giving directions about places in town.
12. Describing your home, neighbourhood and region.

(Note: Practical no.7 to 12 will be covered by using Linguaphone Language lab machine. In every practical student will solve the assignment based on that unit. Student will learn basic English words, their pronunciation, introducing new situations and rules to keep the conversation going)

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Locker, Stephen Kyo Kaczmarek	Business Communication : Building Critical Skills	Published by McGraw Hill Professionals.
2	Alok Pandey & Deepak Pandey	Advanced English Grammar & Composition	Published by Sahni Publication, Delhi-7.
3	Raymond Murphy	Intermediate English Grammar	Published by Foundation Book 2003 (Second Edition), New Delhi.
4	Raymond Murphy	Essential English Grammar	Published by Foundation Book Pvt. Ltd., 2004 (Second Edition), New Delhi.
5	M.P. Bhatia	Applied Grammar & Composition	Published by M.I. Publications (Eighth Revised Edition), Agra.

B) Web sites for references :

1. www.learn4good.com
2. www.fluentzy.com
3. www.edufind.com
4. www.khake.com
5. www.learnenglish.org.uk
6. www.english4engineer.com
7. www.owl.english.purdue.edu

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DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./COMP./E&TC. ENGINEERING

Course : Communication Skills

Course Code: R14SC1708

Course Category: Foundation

Credits : 3

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
1	2	-	-	-		@25	25	50

@ Internal Exam

Rationale:

The old course materials comprising anthologies of prose selections and the old methodology based mainly on the classroom lecture are not conducive to the development of study skills and communicative competence in the students. Therefore, a need to develop an appropriate course in English for students of engineering and technology and to adopt an innovative approach to English language teaching and learning is essential. The aim of this course is to impart to the students the necessary communication skills that they need in their academic and professional life.

This course demands an actual use of the English language by students in the classroom and encourages interaction among them. It is designed to develop the linguistic skills and not to test their memory skills. In this new approach, all the four skills involved in learning a language, namely- 1) Listening 2) Reading 3) Writing 4) Speaking are developed.

Objectives:

The students will be able to

1. Practice the basic skills of speaking, reading, listening and writing.
2. Express their ideas correctly and fluently in English.
3. Interact with others in English and gain confidence in the use of the English language.
4. Realise the importance of effective presentation skill.
5. Improve their communication skill that will lead to their overall personality development.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS
1	Presentation Skills: 1.1 Personal grooming. 1.2 Matter of presentation. 1.3 Manner of presentation.	3
2	Interview Techniques: 2.1 Communication skills. 2.2 Stress management. 2.3 Presence of mind.	3
3	Group Discussion Techniques: 3.1 Manners and etiquettes.	3

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	3.2 Discussion rules. 3.3 Effective presentation of views.	
4	Body Language: 4.1 Facial expressions. 4.2 Posture and gesture. 4.3 Eye movements.	3
5	Resume Writing: 5.1 Correct language. 5.2 Strengths and achievements. 5.3 Format of biodata.	2
6	Vocabulary: 6.1 Synonyms. 6.2 Antonyms. 6.3 Homonyms.	2

Teaching Methodology: Chalk board, Whiteboard, Discussion Method, Power Point Presentation,

Case study, Improved Lecture Method etc.

Term work:

Skills to be developed:

i) Intellectual Skills :

- Listening and speaking skills will be developed on completion of assignments of Term work & the topic of group discussion techniques.
- Presentation skills will be developed by studying the topic of Presentation skills and performing the assignments based on it.
- Writing skills will be developed by studying topic of resume writing.

ii) Skills to be developed in Professional practices are included in these assignments as presentation and guest lectures.

List of Practical/ Assignment/Experiment

1. Interview of the candidates. **(Professional Practices)**
2. Debate on different topics. **(Professional Practices)**
3. Poster Presentation. **(Professional Practices)**
4. Group discussion. **(Professional Practices)**
5. Role Play. **(Professional Practices)**
6. Power Point Presentation. **(Professional Practices)**
7. Talking about different jobs and types of work.
8. Talking about your hobbies and enquiring about those of other people.
9. Enquire about people's programmes, plans and booking facilities.
10. Telephone etiquettes and information about the postal service.

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11. Talking about the public transport system.

12. Talking about accommodation facilities in a hotel & shopping.

(**Note:** Practical no.7 to 12 will be covered by using Linguaphone Language lab machine. In every practical student will solve the assignment based on that unit. Student will learn the conversation techniques, pronunciation, etiquettes, manners and he will develop the ability to speak in different situations).

Learning Resources:

A) Books :

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Dr.B.R.Kishore , D.S.Paul	Kumar's Group Discussions and Interviews	Vee Kumar Publications Private Limited, New Delhi-110008.
2	Adam B. Cooper	PowerPoint Presentations that Sell	McGraw Hill Professionals.
3	R.C.Bhatia	Business Communication	Ane Books India, New Delhi.
4	Krishna Mohan, Meera Banerji	Developing Communication Skills	Published by Rajiv Beri for Macmillan India Ltd., New Delhi.

B) Web sites for references:

1. www.skillstudio.co.uk
2. www.khake.com
3. www.search4excellence.com
4. www.selfgrowth.com
5. www.mindtools.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN: CIVIL/MECH./ELECT./E&TC. ENGINEERING

Course : Applied Science (E.Phy.+E.Chem.)

Course Code : R14SC1709

Course category : Foundation

Credits : 8

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
4	4	*4	80	20	-	-	50	150

* **Note:-** Applied Science contains Section I –Engg. Physics & Section II- Engg. Chemistry. Both the sections will have separate papers of two hours duration each.

Rationale:

Applied Science includes applied Chemistry as well as applied Physics. The Development of various engineering topics is primarily based on the fundamental principles. The different principles of physics have a wide range of applications in all the braches of engineering. A reasonably good level of knowledge of physics, therefore, forms sound base for engineering students. Physics can be considered as a basic tool in the hands of an engineer through which he can pursue his studies and research work in technical field. The foundation level of the subject acquired by the student is kept in mind for selection of the topics. To create interest in the students more stress is given on the applications, in engineering field.

Applied chemistry involves science and chemical principle that have resulted into development of new materials used in modern age. The topic water has wide application in all branches of engineering & technology. In the curriculum topic like Corrosion & its protection is needed for every engineering field. Whereas the study of the Lubricants is needed to know how various types of machines work smoothly and efficiently in various conditions. Students must know the efficiency of various types of fuels, its calorific value and the importance of chemical analysis of the fuel in engineering field.

Objectives:

The student will be able to

1. State the principle and measure the EMF by potentiometer.
2. Understand the concept of resistance and capacitance.
3. Study magnetic effect of electric current and apply right hand thumb rule.
4. Study effect of magnetic field on current carrying conductor and apply Fleming's left hand rule.
5. Differentiate magnetic materials and study their applications in engineering field.

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6. Explain different terms related to lasers, its properties and application in engineering field.
7. After studying the topic Water student will be able to understand the types of impurities present in water, as well as its removal i.e purification processes such as ion exchange method, permutit method and important analytical tests of drinking water.
8. Student will be able to understand definition of Corrosion, its mechanism and different factors affecting the Corrosion. Protection methods like Cathodic protection and Application of different metal coating.
9. By studying Lubricant student will be able to select proper lubricant for different conditions in various Machines.
10. After studying the topic Fuel, student will be able to understand how conventional as well as non conventional energy is used for mankind.

Section-I (Engg.Physics)

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
2	2	2	40	10	-	-	25	75

Section-II (Engg. Chemistry)

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
2	2	2	40	10	-	-	25	75

Section-I (Engg.Physics)

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
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1	<p>1.1 Measurement of Resistance and EMF : Definition of charge, current, Potential difference ,specific resistance, color code for resistance, types of resistance, resistance in series & parallel combinations (numerical), concept of temperature dependence of resistance, thermister, principle of potentiometer and balancing condition of potentiometer, potential gradient, measurement of EMF by potentiometer (numerical)</p> <p>1.2 Measurement of Capacitance: Capacitor & capacitance, units, capacitor in series and parallel combinations (numerical), applications of capacitor (air, solid dielectric, electrolytic)</p>	9	12
2	<p>2.1 Magnetic Effect of Electric Current: Magnetic effect of electric current, lines of induction due to a straight conductor; right-hand thumb rule, magnetic induction (direction and magnitude), concept of uniform field</p> <p>2.2 Effect of Magnetic Field on Current Carrying Conductor: Force of a magnetic field on current carrying conductor, (No derivation) Fleming's left-hand rule, couple acting on a rectangular coil placed in the uniform magnetic field, numericals</p> <p>2.3 Magnetism: Magnetic materials, permeability, susceptibility, relation between relative permeability and susceptibility, properties of diamagnetic, paramagnetic and ferromagnetic substances, ferrites and their application-antenna cores, television picture tube.</p> <p>2.4 Electromagnetic Spectrum: Definition, range, applications</p> <p>2.5 Ultrasonic Waves: Ultrasonic waves, production of ultrasonic waves by magnetostriction transducer, Application – Flaw detection, drilling, welding, cleaning.</p> <p>2.6 Nanotechnology: Introduction to nanotechnology, principle and applications.</p>	14	16
3	<p>3.1 Lasers: Excitation of particle, optical pumping, types of transitions – non radiative and radiative, spontaneous and stimulated emission, population inversion, resonance cavity, active system, Principle of laser, types of lasers, - ruby laser, Helium-Neon laser, comparison between ruby and He-Ne lasers, Uses of lasers – as carrier waves, metal cutting communication, Computers, drilling, radars, depth sounding etc.</p> <p>3.2 Fiber Optics: Principle, types of optical fibers properties & applications.</p>	9	12

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Teaching methodology: Chalk board, Group Discussions, handouts, Question Bank, PPT, Transparency, Seminar, and Guest Lecture.

A) Term work:

Skills to be developed:

i) Intellectual Skills:

- Discrimination skill will be developed after studying topics : types of resistor and capacitors ,types of lasers
- Comprehension skill will be developed after studying concept ,principles laws and rules given in the syllabus

ii) Motor Skills:

- Drawing and connecting circuit skill will be developed after completing practicals.
- Measurement skill will be developed after completing practicals.
- Observing the result and comparing skill will be developed after completing practicals.

List of Practical's /Assignments/Experiments:

- 1) Specific resistance by voltmeter ammeter method.
- 2) Measurement of EMF by potentiometer.
- 3) Measurement of resistance in series and parallel
- 4) To study the effect of temperature on the resistance of – thermister.
- 5) To study the effect of temperature on the resistance of - copper coil.
- 6) Measurement of resistance by using color code and digital multimeter.
- 7) Measurement of divergence of light beam by laser

- Term work includes any six practicals (six weeks)& one mini project/seminar(six weeks)

Learning Resources:

A) Books:

Sr. No.	AUTHOR	TITLE	PUBLISHER
1	R.K.Gaur, S.L.Gupta	Engineering. Physics	Dhanput Raj Publication.
2	Prof.M.P.Kurian Prof.R.B.Birhade Prof.A.A.Mokashi	Applied Physics	Reliable Publications.
3	Dr.A.P.Saxena & Others	Principles of Physics	J.K.Jain Brothers TTTI, Bhopal.
4	Mrs.V.C.Chinchwadkar	Text Book in Physics	Somaiya Publications, Bombay.

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5	David Halliday Robert Resnik	Physics	Wiley Eastern Limited.
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B) Web sites for references:.

www.physicsclassroom.com

www.hyperphysics.com

www.physicsinfo.com

C) Video

www.Youtube.com

D) PPT

www.khanaacademy.com

www.slidehare.net

Section-II (Engg. Chemistry)

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
I	WATER 1.1 Types of impurities in the natural water. 1.2 Definition : Soft water, Hard water, Types of hardness of the Water, 1.3 Degree of Hardness of the Water in terms of equivalent amount of CaCO ₃ , Numerical based on degree of hardness of water 1.4 Bad Effects of hard water in Domestic purposes, In Industries like Textile , Paper , Sugar, Dye industry and in Steam generating boiler 1.5 Water treatment for Industrial applications :Principle , Diagram, Working, Chemical reactions , Regeneration ,Advantages – Permutit/zeolite process and Ion Exchange process 1.6 For Domestic Applications : Water quality parameters for potable water , Treatment of water for domestic application by Screening, Sedimentation , Coagulation , Filtration , Sterilization. Chlorination – using chlorine gas , bleaching powder & chloramines 1.7 Desalination of Sea water (brackish) by Reverse Osmosis 1.8 Definition of pH, pH scale, Numerical problem on pH . Industrial application of the pH	10	12

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II	CORROSION	10	12
	<p>2.1 Definition of Corrosion, Types of corrosion,</p> <p>2.2 Atmospheric Corrosion-definition, mechanism of oxidation corrosion, Types of oxide films and their significance, factors affecting atmospheric corrosion</p> <p>2.3 Immersed corrosion- definition, mechanism of immersed corrosion by galvanic cell action-with evolution of hydrogen gas and absorption of oxygen gas, factors affecting immersed corrosion Protection of Metals by :</p> <p>2.4 Modification of environment , Modification of properties of metal , Electrochemical protection by sacrificial anodic protection and impressed current cathodic protection , use of protective coatings</p> <p>2.5 Applications of metallic coatings by Galvanizing, Tinning, Metal spraying , Electroplating , Metal cladding , Cementation.</p>		
III	A:-LUBRICANTS	06	8
	<p>3.1 Lubricant-Definition, Characteristic of a good lubricant.</p> <p>3.2 Classification of Lubricants-Solid lubricants-characteristics and applications Graphite and Molybdenum disulphide. Liquid lubricants – characteristics and applications synthetic fluid (silicon oil) , Water as a lubricant(coolant), Semisolid lubricants-Characteristics and applications of Grease .</p> <p>3.3 Mechanism of Lubrication – definition of lubrication , Types of mechanism of lubrication : Fluid film lubrication, boundary lubrication & extreme pressure lubrication,</p> <p>3.4 Physical characteristics of lubricants- viscosity, viscosity index , oiliness, volatility, flash and fire point, cloud and pour point, chemical characteristics of lubricants – acid value or neutralization number, emulsification ,saponification value</p> <p>3.5 Selection of lubricants for Road rollers , Steam engine, Sewing Machine , Concrete mixer, IC engine, Cutting tools and Gears.</p>		
	B:- FUELS	06	8
	<p>3.6 Fuels- Definition, calorific value and ignition temperature, characteristics of good fuels with suitable example, advantages and dis- advantages of solid , liquid and gases fuels ,</p> <p>3.7 Classification of fuels , Solid fuels-analysis of solid fuel, proximate analysis of Coal for determination of moisture , volatile matter , ash and fixed carbon, Significance of proximate analysis.</p> <p>3.8 Liquid fuels – origin , fractional distillation of crude petroleum, boiling range, carbon composition and</p>		

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	applications of petroleum fractions obtained . Composition , properties and applications of Bio- diesel 3.9 Gaseous fuels – composition, properties , applications of Biogas, LPG & CNG		
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Teaching methodology: Chalk board, Group Discussions, handouts, Question Bank, PPT, Transparency, Moodle.

Term work

Skills to be developed:

ii) Intellectual Skills:

- Comprehension skill will be developed after studying concept ,principles laws and rules given in the syllabus
- Comprehension skill will be developed after studying topics: Corrosion and water.
- Selection skill will be developed after studying topics: Lubricants and Fuels.

ii) Motor Skills:

- Measurement skill will be developed after completing practicals.
- Observing the result and comparing skill will be developed after completing practicals.

Term work includes six experiments (six weeks) and mini projects or seminar (six weeks)

List of Practical's/Experiments:

- 1) Determination of Total hardness of water by using EDTA method.
- 2) To determine Moisture contents in a given coal sample by proximate analysis.
- 3) To determine Ash contents in a given coal sample by proximate analysis.
- 4) To determine viscosity of liquid by using Ostwald viscometer.
- 5) To determine Dissolved Oxygen in a given water sample by Winkler`s Method.
- 6) To determine pH of different solutions by using pH meter.
- 7) To determine the Acid value of a given oil.(lubricant)

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Learning Resources:

E) Books:

Sr. No.	AUTHOR	TITLE	PUBLISHER
1	Jain P.C. & Jain Monika	Engineering Chemistry	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2	Ved Prakash Mehta	Polytechnic Chemistry	Jain brothers, New delhi.
3	C. V. Agarwal	Chemistry of Engg. Materials	Tara Publucations Waranasi
4	B.K. Sharma	Industrial chemistry	Goel publication
5	S.S.Dara	Engineering Chemistry	S. Chand publication

B) Web sites for references:

1. www.in.wikipedia.org
2. www.nptel.iitm.ac.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Engineering Graphic Skills

Course code : R14ME 1202

Course Category : FOUNDATION

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
2	4	-	-	-	-	-	50	50

Rationale: Drawing which is known as the language of engineers is widely used means of communication among the designers, engineers, technicians & craftsmen in an industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus for the effective & efficient communication among all those involved in an industrial system, it becomes necessary for a diploma engineer to acquire the appropriate skills in the use of graphic language. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects.

Objectives :

The students will be able to

1. Understand basic principles of engineering drawing.
2. Draw orthographic projections of different objects
3. Draw isometric view from given two orthographic views
4. Understand and Draw various engineering curves and know their applications

	NAME OF THE TOPIC	HOURS	MARKS
1	1.1 Introduction to subject : Use of instruments, types of lines, types lettering, full, enlarging and reducing scales, dimensioning techniques. 1.2 Geometrical construction : To construct a regular polygon of given side. To construct a regular polygon in a given circle. To inscribe a circle in a given polygon. To circumscribe a circle around a given polygon.	10	-

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	<p>To draw circles touching each other and the sides of a given polygon internally and externally</p> <p>1.3 Tangent exercises :</p> <p>To bisect a given straight line/arc/angle.</p> <p>To divide given straight line into given number of equal parts.</p> <p>To draw a normal to a given straight line/arc from a given point within or outside it.</p> <p>To draw a straight line parallel to a given straight line / arc through a given point / at a given distance.</p> <p>To draw an arc touching to two straight lines / two arcs (internally / externally) / one line and one arc.</p> <p>To draw an internal / external tangent to two given arcs apart from each other.</p>		
2	<p>21 Redraw figures :</p> <p>To redraw the given figure (using the knowledge of geometrical constructions and tangent exercises).</p> <p>2.2 Construction of curves :</p> <p>To study the construction of following curves using the method mentioned against them.</p> <p>2.3 Ellipse – Directrix focus method, arcs of circle method and concentric circle method.</p> <p>2.4 Parabola – directory focus method and rectangle method.</p> <p>Involutes – of a polygon, of a circle and of combination of a polygon and circle.</p>	6	-
3	<p>Orthographic projection:</p> <p>Conversion of simple pictorial views into orthographic projections using first angle and third angle method of projections. Dimensioning the views.</p>	4	-

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4	Sectional views: Conversion of simple pictorial views into sectional orthographic projections using first angle and third angle method of projection. Dimensioning the views.	4	-
5	Isometric projections and views: Construction and use of isometric scale. Conversion of simple orthographic views into isometric projections / views.	5	-
6	Freehand sketches: The ends and thread profiles. Conventional representation of threads. Types of nuts, bolts, washers, set screws. Types of rivet heads and riveted joints. Types of sections – full, half, revolved, removed offset. Conventional breaks for circle and rectangular sections.	4	-

Teaching Methodology: Discussions, Chalk-Board, Charts, Models, Transparencies

A) Term Work:

Skills to be developed:

i) Intellectual Skills :

- Conversion of given Orthographic Views into Isometric & vice – versa.
- Visualization of an object.
- Drawing of sectional views.

ii) Motor Skills :

- Use of various drawing instruments.
- Drawing of various Engineering Curves.
- Redrawing the given figures.
- Free hand sketching of machine components.

List of Drawing Sheets / Assignments:

Sr. No.	Topic Name	Number of sheets
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1	Geometrical constructions and tangent exercise	1
2	Redraw and Engineering Curves	2
3	Orthographic views	2
4	Sectional views	2
5	Isometric views	2
6	Freehand sketches	1

Learning Resources:

A) Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
01	N.D. Bhatt	Engineering Drawing	Charotar Publication, Anand..
02	Mali and Chaudhary	Engineering Drawing	Vrinda Publications, Jalgaon
03	Kamat & Rao	Engineering Drawing	Jeevandeep Publicatons, Mumbai
04	N.Y. Prabhu	Geometrical Engineering Drawing	Pune Vidyarthi Griha, Publications, Pune.
05	Ozarkar & Utturkar	Engineering Drawing	Maharashtra Publishing house
06	K. Venugopal	Engineering Drawing	New Age International Ltd., Delhi

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Computer Awareness

Course code : R14ME 1206

Course Category : FOUNDATION

Credits : 05

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
1	4	-	-	-	25@	-	50	75

Rationale: Computers have invaded into day-to-day life to a large extent. This foundation course is aimed at making student familiar with computer hardware, operating system, preparation of a document through MS Word, creating tables using MS Excel and preparing presentations using MS Power Point, AUTOCAD.

Objectives:

The students will be able to –

Understand and identified different hardware components.

1. Know about different operating system
2. Create document, table, and presentation using MS-OFFICE software.
3. Understand various tool bars of AutoCAD.
4. Draw the simple drawing.

	NAME OF THE TOPIC	Hours	Practical
1	Introduction: - 1.1: Introduction to computer and applications: Representation of data in computers - bit, byte, and ASCII, binary system, conversion of decimal to binary, memory size in terms of bytes, kilo bytes, giga bytes & tera bytes. 1.2: Computer network: - LAN, MAN, WAN, Firewall, intranet, extranet, Internet, Topology (star, bus, ring)	4	0
	Components of computer: - 1.3: Hardware: - Processors, Memory (RAM, ROM, PROM, EPROM, EEPROM), Input devices (Voice recognition system, scanner), Output devices, Storage devices. 1.4: Software: System software like Operating systems, assembler, compiler, application software like MS-Office, AutoCAD, Introduction to programming language (C, C++)		

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2	<p>MS-Word: -</p> <p>2.1: Introduction, Starting of MS-Word. Creating and Editing a document. Formatting a document:- Font and type size, paragraph formatting, justification, copy and paste, inserting, preview and printing, indent, footer, header, macro, mail-merge, hyperlink.</p> <p>Other features: - find and replace, tables, grammar and spell check.</p> <p>MS-Excel: -</p> <p>2.2: Introduction, Starting of MS-Excel. Creating and Formatting a document. Features: - Auto sum, drag and drop, auto fill, insert clipart, row and column. Charts: - Column, bar, pie, line area.</p> <p>Formula and functions: - Types, terms like cell address, types of references, values, objects, add ins.</p>	4	02
3	<p>MS-Power Point: -</p> <p>3.1: Introduction, Application- presentation and slide show</p> <p>Creating and displaying a presentation.Advantages.MS-access-introduction & basic, creating a database and handling queries.</p> <p>Internet: -</p> <p>3.2: History and use, Basics of www., Various domain name, Search Engines, E- commerce, E- mail and chat, Internet protocols, viruses and anti-viruses</p>	4	04

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4	<p>Auto Cad: -</p> <p>4.1: Introduction: - version, need, changes after its implementation.</p> <p>Advantages, basic shapes and objects, co-ordinate system (Cartesian, polar, absolute, relative.).</p> <p>Starting with A-Cad: - Creating, editing and saving the file, various commands.</p> <p>4.2: Various Commands: Draw command: - line, mline, spline, polygon, rectangle, arc, circle, spline, donut, ellipse, hatch, text, example.</p> <p>4.3: Modify command: - Erase, copy, mirror, offset, array, move, rotate, trim, extend, break, chamfer, fillet, explode, example. Formatting command:- properties, match properties, hatch edit, pedit, spline edit, ddedit (for text), chprop, osnap. Dimensioning command:- linear, angular, radial, aligned. View command:- zoom, pan, redraw, regen, regen all. Settings: - Limits, scale, grid, unit, calling various toolbars.</p> <p>Introduction to 3D and autolisp.</p>	4	04
5	<p>Initial Setting and Drawing Aids:</p> <p>5.1: Set the limits of drawing creating new drawing with wizards & Templates, editing & saving the files. Co-ordinate entry methods, viewing the drawing snap and grid, object snap setting. Getting information about object in drawing.</p> <p>Basic Commands:</p> <p>5.2: Draw command: Line, Mline, Spline, Polygon, rectangle, arc, circle, doughnut, clips, text, text styles, point</p> <p>Modify Command:</p> <p>5.3: Erase, Copy, Break, Fillet, Chamfer, Explode, Osnap.</p> <p>Editing single line text, Entering multiline text, editing multiline text, ddedit(for text)</p>	-	08

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6	Dimensioning: 6.1: Dimensioning Command: Dimensioning concept, types of dimensioning. 6.2: Linear, Angular, radial, aligned, ordinate, dimension style. 6.3: Dimension Styles: Zoom, pan, redraw, regen, regenall Settings: Limits, scale, grid, unit, calling various toolbars	-	06
	Hatching: 6.4: Hatch Command: Hatch pattern, pattern properties, selecting a boundary, view selections, inherit properties, composition, preview & apply hatch.		05

Teaching Methodology:

Chalk- Board, Discussions, PPT, Guest lectures, Transparencies, Computers.

Term Work:

SR. NO.	TITLE	NO. OF ASSIGNMENT
1	Assignments based on MS Word	2
2	Assignments based on MS Excel	2
3	Assignments based on MS PowerPoint	2
4	Make block of outline of drawing sheet	1
5	Assignments based on draw command	4
6	Assignments based on Dimensioning	3
7	Assignments based on Hatching	2
8	Assignments based on Internet	

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Skills to be developed:

- i) **Intellectual Skills:**
 - i. Understand different hardware components
 - ii. Understand the operation of different operating systems
 - iii. Reading
 - iv. Design approach
 - v. Interpretation
- ii) **Motor Skills:**
 - i. Graphical Presentation
 - ii. To get conversant with MS OFFICE & AUTOCAD

Learning Resources:

Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
1.	Moseley & Boodey	Mastering MS-Office Professional	BPB Pub
2.	Laura Acklen	Ten minutes guide to MS-Office 2000	PHZ Pub
3.	Greg Harvey	Excel for dummies	IDG Pub
4.	Tom Badgekt	Teach yourself Power Point	BPB Pub
5.	D.D. Voisonet	Introduction to CAD	McGraw Hill, New Delhi
6.	Alan and Miller	The ABC's of AUTOCAD	BPB Pub
7.	George Omura	Mastering AUTOCAD	BPB Pub
8.	Raker & Rice Alanmillar	Inside Autocad the ABC's autocad 2004	Technical Publication Singapore
9.	BPB Publication New Delhi	Autocad Practice	BPB Publication New Delhi

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course: General Mechanical & Civil Engineering
Course Category : Allied

Course code: R14ME2201
Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
2	4	-	-	-	-	-	50	50

Rationale: An electrical engineer during his/her career has to deal with various aspects in mechanical and civil engineering like selection and installation of drive components, preparation of foundation for electrical equipments like transformers, motors etc. In this course the students will learn about basics of mechanical and civil engineering.

Objectives:

The student should be able to

1. Understand the construction & operation of the basic equipments like boiler steam-turbine, IC engines & pumps.
2. Know about power transmission components like Pulleys, belts, Couplings & Gears.
3. To know about the principals of Surveying, and Leveling.
4. To know about various constructions material used & general procedure for construction of masonry.

Unit	NAME OF THE TOPIC	Hours	Marks
Section I Mechanical Engineering			
1	Properties of steam: steam formation, definition of various terms, introduction to steam table & its use. Boiler, Steam Engines & Turbine: Basic concepts of various types of boilers. Construction & working of steam engine. Principles of working of steam turbines, classification of steam turbine & their operation.	7	-
2	I.C. Engines: Construction & classification of I.C. Engines. Introduction to pumps: Classification of pumps, construction & working of centrifugal & reciprocating pumps.	7	-

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3	Power transmission components: classification & study of various power transmission components like pulleys, belts, couplings & gearboxes. Classification & selection of various types of bearings	3	-
Section II Civil Engineering			
1	<p>Surveying: Definition, Principles. Introduction to distance measuring instruments like 20 m, chain, steel/plastic tape & ranging rods. Chaining & ranging procedures. Offset & offsetting by open cross staff.</p> <p>Leveling: Definition of leveling, introduction to dumpy level & leveling staff.</p> <p>Finding out difference in elevation by simple & compound leveling.</p>	5	-
2	<p>Civil Engineering Materials: Bricks- conventional & IS size. IS specification of cement- type's requirements field tests. Aggregates-necessity, IS specification.</p> <p>Steel- types & characteristics of structural steel. Concrete – Definition, types (RCC & PCC), Steps in manufacture, grades, and requirement in fresh & hardened state.</p>	5	-
3	<p>Construction Technology: Types of structure- load bearing & framed. Foundation-Definition, types of foundations. Concept of bearing capacity & introduction to machine foundation. General procedure of construction of masonry & plastering. Introduction to structural components like slabs, beams, columns-principles of their design & important points to be observed during their construction</p>	5	-

Teaching Methodology: Chalk Board, Discussion, PPT, Guest Lectures

Term Work:

Skill to be developed:

- i) Intellectual Skills:
 - Understand the working of various mechanical devices like turbines, pumps, IC engines & Power transmission components
 - Understand the various equipments used for Surveying, leveling
 - Understand the basic principle of construction technology
- ii) Motor Skills:
 - Handling of equipments used for surveying & leveling

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Sec. I- The term work in Mechanical Engineering should consist of the following

1. Study of boiler
2. Study of steam Engine/turbine
3. Study of I.C. Engine
4. Study of centrifugal pump
5. Study of reciprocating pump.
6. Study of various types of couplings.
7. Study of pulleys & belts.
8. Study of bearings & gearboxes.

Sec. II The term work in Civil Engineering should consist of the following

1. Study of distance measuring equipments like 20 m chain, tapes & ranging rods.
2. Chaining & ranging a line about 50m in length.
3. Chain & cross staff survey of small area.
4. Study of Dumpy level, its adjustments & leveling staff.
5. Compound leveling & fly leveling.
6. Testing of concrete for workability & compressive strength.
7. Study of bonds for half & one brick masonry.
8. Listing of material requirements, work outputs, material & labour rate for some common construction items like- half & one brick thick masonry in cement mortar

Books:

SR. NO	AUTHOR	TITLE	PUBLISHERS
1	Khurmi Gupta	Applied Thermodynamics.	TTTI, Bhopal
2.	Kanitkar	Surveying and Leveling	McGraw Hill Co., IND

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course: General Engineering (Workshop)
Course Category :Allied

Course code: R14ME2202
Credits : 03

Teaching & Examination Scheme

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
1	2	-	-	-	-	-	50	50

Rationale: The students will know the various tools & machinery used in the workshop, various fitting, welding techniques & tin smithy work. To develop practical skills in handling various tools, accessories & equipments in designing / testing.

Objectives:

The student should be able to

1. The students will know the various tools & machinery in the workshop, various fitting, welding techniques & tin smithy work.
2. To develop practical skills in handling various tools, accessories & equipments in designing/testing electronic circuit.
3. To develop skills for identifying, testing various electrical components, measurement of electrical parameters & to be familiar with different wiring systems.

Unit	NAME OF THE TOPIC	Hours	Marks
1	1. Introduction to hand tools like Screw Drivers, Spanners, Files, Vices, and Pliers etc. used in Workshop.	5	-
	2. General information about center lathe, milling machine & drilling machine.	5	
	3. Introduction of general Workshop Processes – Welding, Brazing, Soldering, Tin smithy.	6	

Teaching Methodology: Chalk Board, Discussion, PPT, Guest Lectures

A) Term Work:

The term work shall consist

1. One job of Tin Smithy.
2. One job of Turning & Drilling.
3. One job of Welding.

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4. One job of Brazing.
5. Identification of tools.
6. Study of different machines mentioned in theory.

Skills to be developed:

1. Intellectual Skills :

- i. Identify joining methods for fabrication
- ii. Ability to read & interpret job drawings.
- iii. Ability to identify and select proper material, tools and machines.

2. Motor Skills :

- i. Identify, select and use various marking, measuring and holding, striking and
- ii. Cutting tools & equipments in various shops.
- iii. Operate lathe and milling, drilling machines.
- iv. Produce jobs as per specified dimensions.
- v. Inspect the job for specified dimensions.
- vi. Use welding machines and equipment
- vii. Adopt safety practices while working on various machines.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Hazara Chaudhari S.K. & A.K.	Workshop technology Vol.I	Media Promoters & Publishers

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Industrial Organization & Management

Course code : R14ME 2203

Course Category : Allied

Credits : 03

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
3	-	3	80	20	-	-	-	100

Rationale: This subject is classified under human sciences and is intended to teach students about structure of organization, types of organization, principles of management, functioning of personnel department, industrial laws, and inventory control methods. It also envisages giving exposure to accountancy principles and various networking methods.

Objectives :

The students will be able to,

1. Understand the concept of different business organization.
2. Know activities in the various departments like purchase, marketing, personnel, material etc.
3. Know different acts for execution of factory work.
4. Understand principles of Bookkeeping& accountancy..

	NAME OF THE TOPIC	Hours	Marks
1	Business organizations : 1.1 Types & their foundations, proprietary, partnership, private and public limited companies, co-operative and public sector organizations. Role of public and private sector in the country and their social obligations towards society. 1.2 Principles of organizations, delegation of authority and responsibility, decentralization, committee. Types of organizations such as line/military, staff, line & staff. 1.3 Marketing Management: Definition, Selling V/s Marketing concept, Functions of Marketing management, Market Research, Definition, functions & agencies of advertising, Types of market.	9	12

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2	Human Resource Management : 2.1 Personnel management: Duties and responsibilities of personnel management, Manpower planning, Sources of employment, recruitment, selection. Various methods of testing, training and development of workers and supervisors, duties and authorities of supervisors, morale maintenance, motivation. 2.2 Wages and Incentives: Definition of wages, wage payment plans, Concept of incentive. 2.3 Safety management: Causes and effects of accident, Safety programmes. 2.4 Labour Laws: Factory act, Employee's State Insurance act, Workmen's Compensation act, Dispute act.	9	16
3	Material and Stores Management : 3.1 Introduction to the functions of material management, material flow in an industry, purchase functions and systems, purchase procedure. Receipt and Issue of material, Types of stores, centralized & decentralized purchase. 3.2 Inventory Control: Objectives of inventory control, inventory and its classification, EOQ (Economic Order Quantity) its derivation (no numericals), ABC analysis, Material Requirement Planning (MRP).	7	12
4	Management Process: 4.1 Management and its various definitions, Importance of management, Difference between management, organisation and administration, Evolution and development of management, Levels of management scientific management. 4.2 Principles of management (14 principles of Henry Fayol). 4.3 Functions of management such as planning, organising, directing, controlling, etc.	6	12
5	Financial Management: 5.1 Objectives & Functions of Financial management. 5.2 Capital Generation & its Types, Finance (methods of raising capital), Finance from Bank, Capital market, Financial institutions, Shares & its types, Debentures, Loans, Financial Ratios. 5.3 Book Keeping & Accountancy, its objectives, principles of double entry book keeping, Accounting Terminology.(Numericals only on Journal & Ledger Account) 5.4 Introduction to Trading account, profit and loss account & Balance Sheet (No Numericals)	9	16

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6	Project Management & Quality Management 6.1 CPM/PERT Technique: CPM terminologies, Definitions in PERT, Comparison of CPM & PERT (No Numericals) 6.2 Quality management, Quality Policy, Quality control, Inspection, Concept of Quality circle, TQM, Quality Audit.	8	12
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Teaching Methodology: Chalk-Board, Discussions, Transparencies.

Skills to be developed:

Intellectual Skills :

- Understand functions and managerial skills required for various departments.
- Understand the principles of double entry book keeping system.
- Interpret transactions in journal, ledger and balance sheet.

Learning Resources:

Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
1.	Dr. O.P. Khanna	Industrial engineering & management	Dhanpat Rai & Sons, 1992
2.	J. R. Batliboi	First Steps in Book Keeping	
3.	Dr. B. C. Punmia and K. K. Khandelwal	Project Planning and Control with CPM and PERT	Laxmi Publication, 2002

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN:MECHANICAL/ELECT./COMP./E&TC. ENGINEERING

Course : Advanced Mathematics

Course Code: R14SC2701

Course Category: Allied

Credits : 3

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
3	-	3	80	20	-	-	-	100

Rationale:

Mathematics is the backbone of all technical courses. Understanding the engineering concepts requires logical approach and thinking. The course aims to give the Diploma students a perfect knowledge of Mathematics which can be used in the Engineering field. They will be able to apply the advanced concepts of Mathematics in solving the varied kinds of engineering problems.

Objectives:

The students will be able to

3. Learn the new concepts of Integration, Laplace transform, Probability and Differential equations.
4. Solve the given mathematical problem with intelligent combination of techniques.
5. Apply the laws and principles of Mathematics to practical situation.

Course Details:

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	Integration: 1.4 Different methods of integration. Integration by different types. Some general integral. Integration by parts. Integration by partial fraction. 1.5 Definite integral. Properties of definite integral.	12	16

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2	Application of Integration: 2.1 Area under the curve. Area between two curves. 2.2 Mean value. 2.3 Root mean square value.	8	12
3	Introduction to Laplace Transform: 3.1 Definition of Laplace transform. First shifting theorem. 3.2 Inverse Laplace transform. Properties of inverse Laplace transform.	6	12
4	Differential Equation: 4.1 Definition of differential equation. Order and degree of differential equation. Formation of differential equation. 4.2 Solution of differential equation of 1 st order and 1 st degree. Variable separable differential equation. Homogenous differential equation. Linear differential equation.	8	16
5	Probability: 5.1 Definition: event, sample space and probability. 5.2 Introduction to permutation and combination. Factorial notation. Meaning of ${}^n P_r$ and ${}^n C_r$. 5.3 Addition theorem for probability. Simple examples on probability. 5.4 Conditional probability.	8	12
6	Probability Distribution: 6.1 Binomial distribution. 6.2 Poisson distribution. 6.3 Normal distribution.	6	12

Teaching Methodology: Chalk board, Discussion, Assignments, printed notes.

Skills to be developed:

i) Intellectual Skills:

- Memorizing skill will be developed after studying the formulae of all the topics.
- Selection skill will be developed after studying the methods of solving problems during selection of appropriate formula.
- Logical thinking will be developed after studying the topic Probability.
- Application skill will be developed after studying the topic Application of Integration

Learning Resources:

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A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Peter V. O'Neil	Advanced Engineering Mathematics	Thomson, Canada.
2	Joel L.Schiff	The Laplace Transform	Springer Verlag, New York.
3	Shanti Narayan	Engineering Mathematics Vol. I & II	S. Chand & Company, New Delhi.

- B) Web sites for references: 1. www.wikipedia.com ,
2. www.wolfarm.com
3. www.mathworld.com
4. www.nptel.iitm.ac.in

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course: Environmental Studies (Electrical)

Course code : R14EE2301

Course Category: Allied

Credits : 03

Teaching and Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
02	01	-	-	-	-	@25	25	50

Rationale: In this course the student will understand the concept of Environmental engineering. This course will also help the student to learn various aspects of environment of electrical industries.

Unit	Name of the Topic and Contents	Hours	Marks
1	Environmental Studies: Definition, Scope and Importance of the environmental studies, Need for creating public awareness about environmental issues, 3R's of environment i.e. Reduce Reuse and Recycle of resources, recycle facilities. Symbols and logos used for environment related issues, CE Marking and its purpose.	8	-
2	Natural Resources and Associated Problems: Renewable and Non renewable resources: Definition -natural resources, Associated problems: Identify uses and their overexploitation, Forest Resources: General description of forest resources , Functions and benefits of forest resources, Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. Water Resources-- Hydrosphere: Different sources of water, Use and overexploitation of surface and ground water, Effect of floods, draught, dams etc. on water resources and community Mineral Resources: Categories of mineral resources, Basics of mining activities, Mine safety, Effect of mining on environment Food Resources: Food for all, Effects of modern agriculture, World food problem	10	-
3	Ecosystems: Concept of Ecosystem, Structure and functions of ecosystem, Energy flow in ecosystem, Major ecosystems in the world, Green House Gas.	8	-
4	Environmental Effects (Awareness level): Nomenclature , Definition of pollution , pollutant ,causes of pollution , types of pollution. Air pollution–Definition, Types of air pollutant, Sources & Effects of air pollutants such as CO _x , NO _x , SO _x , Hydrocarbons, Particulates, Automobile pollution due to IC engines & its control methods. Air pollution control methods	10	-

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	<p>– Gravitational settling chamber, Cyclone separators, Fabric filters, Electrostatic precipitators, Wet collectors or scrubbers with figures and uses. Global environmental issues – Green House Effect, Acid Rain, Ozone layer depletion.</p> <p>Environmental Effects (Awareness level): Water Pollution and Noise Pollution : Definition of water pollution, Causes & sources of water pollution, classification of water pollutants, such as Organic pollutants, Inorganic pollutants, Sediments, Radioactive pollutants, Thermal pollutants. Definition of BOD, COD, DO ,Eutrophication & Algal bloom Wastewater treatment –Primary & Secondary for municipal wastewater, Arsenic contamination (ground water pollution) E-WASTE - Their origin & control measures, Do's and Don'ts of E-waste, E-waste and their governing bodies Hazardous Waste, disposal facilities, disposal of electric lamps, Tube lights, cables, batteries, etc. NOISE POLLUTION –Definition, sources, effects , Levels of noise , Noise level standards & control.</p>		
5	<p>Social Issues and Environment: Concept of development, sustainable development, Water conservation, Watershed management, Rain water harvesting: Definition, Methods and Benefits, Climate Change, Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust: Basic concepts and their effect on climate, Concept of Carbon Credits and its advantages.</p>	8	-
6	<p>Environmental Protection: Brief description of the following acts and their provisions, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act Population Growth: Aspects, importance and effect on Environment, Human Health, Effects of EMI and RF on the health of human being and other living beings and Human Rights, Rules and regulation related to environment, ISO 14001,17025(certified analytical test methods and related IS related to environment)</p>	10	-

Teaching Methodology: Chalk Board, Improved Lecture Method, Discussion Method, Power Point Presentations.

Term Work:

Skills to be developed:

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- i) **Intellectual Skill:** • Selection • Understanding • Report Writing • Interpretation • Reading

Term work shall consist of the following:

A) Assignments consist of -

1. A report on - Earth's Evolution.
2. A report on- Measures to be taken to prevent land degradation.
3. A report on – Significance of forests on productivity of major biomass.
4. Study of Biodiversity with reference to the bio-geographical regions of India.
5. Study of measures to be taken to control various types of pollutions.

B) A detail report to be prepared after conducting survey on electrical energy conservation.

C) Visit to a residential locality to discuss environmental matters with the residents for spreading general awareness. A detailed survey report to be prepared & submitted by a group of 8-10 students.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	M.N.RAO & V.N.RAO	Air Pollution & Control Technologies	Tata McGraw Hills, New Delhi
2	Anubha Kaushik & C.P.Kaushik	Perspectives In Environmental Studies	New Age International Publishers
3	P.Venu Gopala Rao	Principals Of Environmental Science & Engineering	Prentice Hall Of India Pvt. Ltd., New Delhi
4	Elements of Environmental Science & Engineering	P. Meenakshi	PHI Learning Pvt.Ltd., New Delhi

B) Web sites for references :

www.neeri.res.in

www.bae.ncsu.edu

www.barc.gov.in/pubaware/index.html

www.mpcb.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Basic Electronics

Course Code : R14EX 2501

Course Category : ALLIED

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	-	25	125

Rational: A diploma holder in Electrical Engineering has to deal with Electronic components while controlling the Electrical systems & as equipments. In this course the student learn about the basics, working, construction of the various components of Electronics such as SCR, BJT, UJT, amplifiers, oscillators.

Objectives:

The students will be able to -

1. Understand the Semiconductor devices Diode, Transistor.
2. Understand voltage amplifier.
3. Describe Small signal amplifiers and Large signal amplifiers.
4. Know concepts and types regulated power supply.
5. Know working principles of photo devices.
6. Understand Effect of feedback on amplifiers performance.

	NAME OF THE TOPIC	Hours	Marks
1	Semiconductor devices. 1.1 Constructional features, working & characteristics of the junction diode & Zener diode. Their rating & uses. 1.2 Constructional features & working of PNP, NPN BJTs in the grounded base & grounded emitter configuration. BJT rating. Comparison of 3 configurations. Alfa & beta, cutoff frequencies. Mechanism of flow of current in the BJT's & diode. 1.3 Constructional features, working, characteristics of JFET, MOS, UJT, DIAC, SCR, Photo diode, Photo transistor, Photo tube, vacuum & gas filled types.	12	16

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2	<p>Small signal amplifiers.</p> <p>2.1 BJT as amplifiers, different biasing methods. Load line, types distortion in the amplifiers.</p> <p>2.2 Multistage amplifiers. RC coupled LC coupled. Transformer coupled & tuned amplifier, their frequency response curves, analysis of curves, and bandwidth of the amplifier.</p> <p>2.3 Calculation of the voltage gain of an amplifier (using simple method).</p>	10	12
3	<p>Large signal amplifiers</p> <p>3.1 Classification of amplifiers on the basis of voltage & power amplification.</p> <p>3.2 Power amplification circuit & its working. Class A, Class B, Class AB, and Class C, Push pull amplifiers: Working, advantages, disadvantages.</p> <p>3.3 Transistor phase inverter. Complementary symmetry push pulls amplifier- working, advantages, disadvantages. Emitter coupled DC differential amplifier.</p>	10	12
4	<p>4.1 Darlington amplifier- circuit & working. Thermal working & collector dissipation & heat sink.</p> <p>4.2 Power supply- Junction diode as half wave, full wave & bridge rectifier circuits & operation.</p> <p>4.3. Filters- inductors, shunt capacitor, L type – their working, advantages, Disadvantages. Simple calculation of output voltage, PIV, ripples frequency, rating of diodes to be used in above circuit.</p>	12	16
5	<p>5.1 Zener regulated power supply- working & simple calculations. Voltage doublers & multiplier circuits & their working.</p> <p>5.2 Oscillators- Advantages & uses. LC oscillators, block diagram & its working. Criterion for sustained oscillations. Hartley, Colpitts, tuned & crystal oscillator circuits & working.</p> <p>5.4 Electronic emissions- Methods of emission, practical emitters. Construction & operation of CRO, method of deflection.</p>	10	12

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6	6.1 Photovoltaic cells, Triac, Photomultiplier, optocoupler with uses. Detector – Idea & necessity of modulation, diode as detector; circuits & operation. 6.2 Feedback amplifies- Introduction, positive & negative type of feedback. Effect of feedback on amplifiers performance, its advantages. Simple calculations on negative feedback.	10	12
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Teaching Methodology: Chalk-Board, Discussion, Power Point Presentation, Transparency, Expert Lectures.

A) TERM WORK

Skills to be developed:

i) Intellectual Skills:

- Understand the construction & operation of various semiconductor devices.
- Identify the uses of the various electronic components
- Understand the working of the electronic equipments Amplifier, CRO, Power Supply, Photovoltaic cell

ii) Motor Skills:

- Proper connection of the components as per circuit diagram
- Measurement of the readings of the parameters
- To plot the graphs as per the readings taken

List of Practical / Assignments / Experiments

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

1. Study & characteristics plotting of junction diodes.
2. Plotting input & output characteristics of BJT in ground emitter configuration.
3. Plotting input & output characteristics of BJT in ground base configuration.
4. Characteristics of a phototransistor.
5. Determination of electrostatic & electromagnetic deflection sensitivity of CRT.
6. Determination of anode characteristics of SCR.
7. Study of single stage transistor amplifier, measurement of its gain & plotting of its frequency response curve.
8. Building of half wave, full wave & bridge rectifier circuit with & without shunt capacitor & determination of their regulation characteristics.
9. Designing a Zener regulated power supply & determination of its regulation characteristics.
10. Tracing & calibration of oscillator

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11. Emitter coupled differential amplifier – study of its operation for common mode & differential mode.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Millman & Halkies	Elements of Electronics.	Prentice Hall of India, New Delhi.
2	V.K.Mehta	Principles of Electronics.	S. Chand & Co. New Delhi
3	B.L.Theraja	Electrical Technology. (Volume IV)	S. Chand & Co. New Delhi.

B) Magazines:

1. Electronics for you.
2. Digit.

C) Web sites for references:

www.en.wikipedia.org.

www.electronics-tutorials.com

www.indianscientificinstrument.com

www.alldatasheet.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Total Quality Management

Course Code : R14ME 2204

Course Category : Allied

Credits : 03

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
2	1	-	-	-	-	25@	25	50

Rationale: Indian organizations are facing a challenge from the inflow of MNCs ever since the Government implemented the policies of lubrication, privatization & globalization. In the light of this, there is a dire need of new ideas, approaches and techniques for attaining a competitive edge. The course aims at exposing various aspects of TQM like cost of quality, QC tools, Kaizen, quality circles, team work for quality, customer satisfaction, benchmarking, quality culture, quality standards and quality audit.

Objectives :

The students will be able to

1. Know about detail clauses of ISO 9000 series
 2. Know about the TQMEX model, Japanese 5 – S practice etc.
 3. Understand the various quality challenges faced by industry.
- 1) Know old as well as new tool for quality improvement.

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	TQM :TQM – Definition, Aim, and guide line principles, salient features. Difference between ISO & TQM. The TQMEX model, Japanese 5-S practice, 5 pillars of TQM, Core concept of TQM- Quality for profit, Right first time. Acceptance Quality Level. Quality Gurus: Philip crossby, Feignenbaum, Ishikawa, Shigeo shingo, Deming's 14 point methodology, Juran's quality trilogy.	6	-

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	<p>Kaizen :Concept of Kaizen, Kaizen v/s innovation, Kaizen and management process oriented and result oriented management. Company wide quality control (CWQC). Kaizen the practice. Deming cycle- PPCA cycle. Quality Control Circles. Types of Kaizen-Management oriented, Group oriented, Induction Oriented</p>		
2	<p>Six sigma:Introduction, concept, Quality approaches models, Belts in six sigma, six sigma cost and savings, eliminate waste (DMAIC), six sigma in manufacturing and six sigma in service industry. Zero defect programme.</p> <p>Quality Challenge facing Industry, Total Quality & Internationalism, Role of Govt. 9 M's affecting Quality. 4 Jobs of Quality Control. Role of Statistics in QC.</p>	4	-
3	<p>Quality of product design and development: Introduction, quality of design, Product development, FMEA, FMECA.</p> <p>Tools for Quality Improvement :</p> <p>Quality improvement, Methods of quality improvement, Break through sequence, Tally sheet, Graphs, Histograms, stratification, Scatter diagram, Pareto diagram, frequency distribution, flow chart, Brainstorming, 5 W & 1 H.</p> <p>New Q. Tools, Flow diagrams, Flow chart, Cause and effect diagram, Relations diagram, Tree diagram, Matrix flow diagram, Matrix data analysis diagram, Arrow diagram, Applications of new tools.</p>	6	-

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4	<p>Incoming Material Control :</p> <p>Need, Principles of vendor relations in Quality, Pattern for incoming material control routine: - Purchase analysis, Vendor selection & order placement. Material receipt & material examination, material disposal. Vendor relations, Vendor ratings and Vendor quality ratings.</p> <p>Control Charts & Acceptance Sampling :</p> <p>Use of X & R chart, p chart. np Chart, c Chart for Quality Control. Sampling inspection, OC curve and terms in OC curve, uses of OC curve, IS 2500 for selection of sampling plans</p>	6	-
5	<p>Total waste elimination:</p> <p>What is waste? Classes of wastages, Sources of waste, Waste identification, Steps of waste elimination, TWE methods.</p> <p>Achieving total commitment to Quality :</p> <p>Introduction, Total commitment to quality, Activities for achieving total commitment to quality, Quality education and training for total commitment to quality, Quality mindedness, Participative approaches for total commitment to quality, Other key approaches, Communication, motivation for development of TQM.</p>	4	-

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6	<p>ISO 9000 :</p> <p>System, Management system, Quality management system, What is ISO 9000 series of standards? Structure, scope and approach of ISO 9000 (2000) series standards, 8 Quality management principles. ISO 9000:2000, Types of audit, Benefits and stages of Audits. Advantages and disadvantages of ISO 9000. Registration of ISO 9000, Validity of registration, Organizing the documentation.</p> <p>ISO 9001:</p> <p>ISO 9001:2000, Quality management systems – Requirements for quality assurance, Advantages of ISO 9001 (2000) , Reversed ISO 9001:2000 standard characteristic, Comparison of ISO 9001 (2000) and ISO 9001 (1994). Ten tips of moving to ISO 9001 (2000). ISO 14000 & ISO14001, Comparison of ISO14000 and ISO 9000, Why ISO 14001.</p>	6	-
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Teaching Methodology: Discussions, Chalk-Board, Transparencies

A) Term Work:

At least two topics from the syllabus have to be selected by group of student and they are supposed to give seminar / presentation. Minimum nine assignments consisting of at least one on each topic are to be completed.

One visit to a relevant industry and student will submit a report of the visit as a part of term work.

Skills to be developed:

iii) **Intellectual Skills :**

- Understand TQM Methodolgy.

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- Report writing on ISO 9000, ISO 9001.
- Enhance learning to learn skills.

iv) Motor Skills:

- Preparation of power point presentation / Transperancies.

Learning Resources:

Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
1	Dr. K. C. Arora	Total Quality Management	S.K. Kataria & Sons Pub., New Delhi.
2	Juran and Gryna	Quality Planning & Analysis	Tata McGraw Hill Publications, New Delhi.
3	Tapan P. Bagchi	ISO 9000	Wheeler Publications.
4	R.K. Jain	Engineering Metrology	Khanna Publications, New Delhi.
5	Poornima M. Charantimath	Total Quality Management	Pearson Education Pub., New Delhi.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Marketing Management

Course Category : Allied

Course code : R14EE 2302

Credits : 03

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
2	1	-	-	-	-	25@	25	50

Rationale:

An engineer of any branch may be required to deal with marketing activity related with his field. This course covers the basic techniques used in the marketing management generally related with any field of application

Objectives: The student should be able to

1. To know the principles of market research & analysis
2. To know about the organization of marketing department & marketing network
3. To know about the aspects of international marketing.
4. To undertake a small market survey

	NAME OF THE TOPIC	Hours	Marks
1	1.1 Introduction - Marketing Management, process & functions. Developing marketing strategies. Marketing environment	4	-
2	2.1 Market Research & Sales forecasting - Need of market research, Methods of data collection, sales forecasting, consumer behavior, Case Study.	4	-
3	3.1 Market Planning - market positioning, market targeting, marketing strategy, product policy, branding, pricing & pricing strategy, Advertising	4	-
4	4.1 Sales management- Setting objectives & deciding policies, development of sales force, sales organization 4.2 International marketing - Liberalization, need of International Marketing, International marketing process & Exim policy of Govt. of India, Case Study	4	-

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Teaching Methodology: Group Discussion, Visits, Guest Lectures

Skills to be Developed:

Intellectual Skills:

- Identify the functions & processes of marketing
- Selection of suitable method of marketing
- Interpretation the data collected
- Understanding the consumer requirement
- Report writing about the market survey conducted

Term work:

A group of 4 to 5 students have to complete the following assignments

1. Select an existing /hypothetical product related with their discipline
 2. Carry any market survey by preparing suitable questionnaire.
 3. Prepare a marketing plan indicating the advertising, price strategy & sales promotion techniques.
 4. Prepare & submit the report of above activities.
- The internal oral examination will be conducted on the above report.

Reference:

Sr. No	Author	Title	Publishers
1	Kotler	Marketing Management	(11 th Edition), Pearson Education India.
2.	Dr. V.O. Vorkey	A Handbook on Marketing Management	Everest Publishers, Pune
3.	Dr. S. L. Gupta	Elements of Marketing Management	Everest Publishers, Pune

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name: Entrepreneurship Development Course code : R14ME 2205

Course Category : Allied Credits : 03

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
2	1	-	-	-	-	25@	25	50

Rationale: The entrepreneurship development part of the subject consists of topics related to the development of entrepreneurial skills and other details such as selection of product lines, site selection, financial aspects, personnel management, quality control and creative thinking. The subject includes case studies in the related field. The subject emphasizes the development of enterprising qualities among young engineers.

Objectives :

Students will be able to

- 2) Identify entrepreneurship opportunity.
- 3) Acquire entrepreneurial values and attitude.
- 4) Use the information to prepare project report for business venture.
- 5) Develop awareness about enterprise management.

UNIT	NAME OF THE TOPIC	HOURS	MARKS
1	<p>1.1 Introduction: Definition of entrepreneur, concept of entrepreneur and entrepreneurship, importance of entrepreneur. Types of entrepreneur: Innovating entrepreneur, imitative entrepreneur, Fabian entrepreneur, drone entrepreneur and according to type of business. Difference between Entrepreneur and Entrepreneur.</p> <p>1.2 Entrepreneurial Competencies: - Characteristics of an entrepreneur, qualities of an entrepreneur, competencies of entrepreneur.</p> <p>1.3 Women Entrepreneur:</p>	6	-

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	<p>Definition, characteristics of women entrepreneur. Causes of limited growth in India, remedies for limited women entrepreneurship development.</p>		
2	<p>Motivation: Definition and concept of motivation, types of motivation: affiliation, power, and achievement motivation. Need and importance of achievement motivation, challenges of motivation, Motivating factors. Theories of motivation: a) Maslow Hierarchy theory ,b)Mc Gregor X-Y theory, c) Hygiene Factor theory.</p>	4	-
3	<p>Creativity and Innovation: Definition and concept of Innovation, definition and concept of Creativity. Characteristics of creative people. Discussion of various examples with respect to creativity and innovation.</p>	5	-
4	<p>4.1 Business Opportunity Search and Scanning: Opportunities available in different sectors such as manufacturing, services and trading. Classification of opportunities on the following: - Natural resource based, Demand based, Local industrial based, Service sector based, Export based, Skill based, Off-farm based.</p> <p>4.2 Business Idea: Search for business idea, sources of business idea, ways of generating ideas, ideas processing & selection (factors affecting product idea).SWOT Analysis.</p> <p>4.3 Sources of Business Idea:</p>	6	-

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	Market survey & techniques, prospective consumers, development in other nation, study of project profile, government organization, trade fair and exhibitions. Checklists for information collection.		
5	Government And Non Government Agencies For Promotion and Development: Importance of funds, Types of funds. Various schemes of assistance of government, Government policies and incentives. Registration with various government agencies, definition of SSI and Ancillary.	5	-
6	Business Plan Preparation : Project identification, project formulation, feasibility analysis, Estimation of cost of production, Cost volume profit relationship at different levels, Interpretation of financial statements, Institutionalized and Non-institutionalized sources of working capital, Funds flow statements, Loan application form for appraisal. Project report preparation.	6	-

Teaching Methodology: Group Discussion, visits, guest lectures.

A) Term Work:

Skills to be developed:

Intellectual Skills :

- Identify various opportunities in market.
- Identify individual's entrepreneurial competencies.
- Interpret risk to be taken during a task.
- Interpret SWOT of individual.
- Prepare a report of business plan.
- Enhance/Improve presentation and writing skills.

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List of Experiments / Practical / Assignments:

1. Self Disclosure Exercise. (Who am I?).
2. Self rating questionnaire.
3. Interview of a successful entrepreneur.(Professional Practices)
4. Interview / Biography of a successful women entrepreneur.
(Professional Practices)
5. Thematic Appreciation Test (TAT).
6. Ring Toss Exercise.
7. Tower Building Exercise.
8. Convince and Crown.
9. Creativity and Problem solving.
10. Walking through Market. (Professional Practices)
11. Business plan preparation. (Professional Practices)
12. Biography of any entrepreneur.

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Professional Practices:-

1. Walking through Market.
2. Business plan preparation.
3. Interview of a successful entrepreneur.
4. Interview / Biography of a successful women entrepreneur.

Learning Resources:

Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
1.	Vasant Desai	Dynamics Of Entrepreneurial Development And Management	Himalaya Publishing House, 1997, Reprint-1999
2.	Dilip M. Sarwate	Entrepreneurial Development Concept and Practices	Everest Publishing House, 1996
3.	Gupta Srinivasan	'Entrepreneurial Development	Sultan Chand & Sons, 1993
4.	D. D. Mali	Training of Entrepreneurship And Self Employment	Mittal Publications, 1999

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course: Electrical Engineering Materials
R14EE3301

Course code:

Course Category : Core
:03

Credits

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
3	-	3	80	20	-	-	-	100

RATIONALE:

An Electrical Engineering diploma passed student learns through this course knowledge of Electrical Engineering Materials for performing various duties such as wiring contractor, installation supervisor, Insulation inspection for installations, equipments, instruments

Objectives:

The student should be able to

5. To know about the classification of materials with respect to their Electrical & Magnetic properties.
6. To know about the characteristics of conducting, magnetic, semi-conducting, insulating materials Examples, & their selection parameters.

	NAME OF THE TOPIC	Hours	Marks
1	<p>1.1 CLASSIFICATION: Classification of Materials into conducting, semi conducting & insulating materials with reference to atomic structure, energy band theory.</p> <p>1.2 PHYSICAL PROPERTIES OF MATERIALS: Elasticity, ductility, malleability, brittleness, toughness, hardness, formability & weld ability.</p> <p>1.3 SPECIAL PURPOSE MATERIALS: Bimetal, Soldering materials, fuse materials. Applications of special material.</p> <p>Materials- Classification of plain carbon ,steel, nickel chrome, tungsten & silicon steel. Copper- properties & applications, fabrication process. Brass properties,</p>	07	12

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	Mu-metal, naval & silicon brass. Bronze properties. Al-alloys.		
2	<p>2.1 CONDUCTING MATERIALS: Resistivity and factors affecting resistivity , superconductivity. Low resistivity materials: copper, Aluminium and steel, their general properties as conductor. Resistivity, temperature coefficient of resistance, Mechanical properties, corrosion, solderability & contact resistance. Suitability of copper, Aluminium and steel for various applications as electrical conductors.</p> <p>2.2 LOW RESISTIVITY MATERIALS: Copper alloys- Brass, Bronze (cadmium & beryllium), their practical applications.</p> <p>High resistivity materials: Constantan, Nichrome, Manganin, Carbon, Tungsten their properties and application.</p>	10	16
3	<p>3.1 SEMI CONDUCTING MATERIALS: Conduction in semi-conductors, Energy level bands for semi-conductors. Crystal and Co-valent bonds, Fabrication process of materials used as semi-conductors.</p> <p>Intrinsic Semiconductor, Extrinsic semiconductor, P-type, N-type semiconductors, P-N junction diode, P-N-P transistor and N-P-N transistor. Applications of semi conductors,</p>	07	12
4	<p>4.1 INSULATING MATERIALS: Electrical Properties: volume resistivity, surface resistance, dielectric loss, dielectric constant. Concept of Breakdown Voltage Strength, Factors affecting Breakdown voltage of an Insulating Material & Methods to determine it.</p> <p>4.2 Physical properties: compressive strength, abrasive resistance.</p> <p>4.3 Thermal properties: Heat resistance, classification according to permissible temperature rise, effect of overheating on the life of electrical insulation. Increase in rating with the use of insulating materials having higher thermal stability.</p> <p>4.4 Chemical properties: Solubility, Chemical resistance,</p>	09	16

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	Flash point.		
5	<p>5.1 PLASTIC INSULATING MATERIALS: Definition & classification, Thermo setting materials (phenol formaldehyde, amino resin and epoxy resins.), their properties and application. Thermo plastic materials (polyvinyl chloride, polythene), their properties and applications. Fiber glass reinforced plastic.</p> <p>5.2 OTHER INSULATING MATERIALS: Mica and mica products. Asbestos and asbestos products. Ceramic materials, glass and glass products. Cotton, silk, jute, paper (dry and impregnated), Prespahn and Latheroid , rubber , bitumen , insulating oil, insulating varnishes, enamel, XLPE- Cross Link Poly Ethylene Gaseous materials : Air, Hydrogen, SF6.</p>	08	12
6	<p>6.1 MAGNETIC MATERIALS: Ferromagnetic materials: High silicon alloy steel and low silicon alloy steel, cold rolled grain oriented and non oriented steel, Nickel iron alloy, soft ferrites, their properties & application.</p> <p>6.2 HARD MAGNETIC MATERIALS: Tungsten steel, chrome steel, cobalt steel , Alnico, Hard ferrites. Applications of magnetic materials.</p>	07	12

Professional Practice:

Demonstration of Breakdown of Solid/ Liquid Insulating Material by arranging the Educational Visit in Industry or conducting the practical in institute.

Reference Books:

SR. NO	AUTHOR	TITLE	PUBLISHERS
1	Raina, Bhattacharya	Electrical Engineering Materials	TTTI, Bhopal
2.	N. Appagalam	Electrical Engineering Materials	McGraw Hill Co., IND

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Mechanical Engineering
3302

Course code : R14ME

Course Category : CORE

Credits : 05

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
3	2	3	80	20	-	-	50	150

Rationale: It is expected that the Diploma holder in Electrical Engineering have to deal with number of mechanical equipments in industry from the various aspects like operation, maintenance etc. Though their branch being Electrical, they must have adequate knowledge of Mechanical Engineering. In this course he will learn about the basics of I C Engines, Heat treatments, forces, hydraulics, pneumatics

Objectives : The students should able -

1. To understand the concepts of shear forces , bending moment torsion,
2. To know about various mechanical properties of materials
3. To know about composition & properties of commonly used metals & alloys.
4. To know about testing methods of to determine the mechanical properties
5. To know about the basic principles of hydraulics, hydrostatics, fluid flow.
6. To understand the construction & working of water turbines, venturimeter.
7. To understand the concept of pressure.
8. To understand the principle of heat transfer, powder metallurgy & power transmission.
9. To know about the construction & working of I C Engine& its characteristics
10. To know about the various welding methods in industries.

	NAME OF THE TOPIC	Hours	Marks
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1	<p>1.1 Shear Force & Bending Moment- Shear force calculation, cantilever, simply supported beam, concentrated load & uniform load, bending moment, maximum bending moment.</p> <p>Torsion: Twisting of solid & hollow shafts, torsional rigidity power, and torque.</p>	08	12
2	<p>2.1 Mechanical Properties of Materials – Elasticity, ductility, malleability, brittleness, toughness, hardness, formability & weld ability.</p> <p>2.2 Testing of materials-Destructive, non-destructive testing, tensile, compressive, fatigue, impact & hardness test, magnetic crack detection, ultrasonic, radiographic tests. Stress-strain curve, elastic limit, Hook’s law, Young’s modulus, thermal stress.</p> <p>2.3 Materials- Classification of plain carbon steel, nickel chrome, tungsten & silicon steel. Copper- properties & applications fabrication. Brass properties, Mu-metal, naval & silicon brass. Bronze properties. Al- alloys.</p>	08	16
3	<p>3.1 Hydrostatics: Properties of gases & liquids, related terms, calculation of pressure head, its conversion to height of water column.</p> <p>3.2 Pressure – vacuum & absolute pressure. Bernoulli’s theorem, its application in the venturimeter. Calculation of c.c. cv, cd flow through notches, water turbine.</p> <p>3.3 Fundamentals of fluid flow, discharge, types of flow</p>	08	12

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4	<p>4.1 Heat treatment: Electrical conductors, annealing of steels, its effect on mechanical & electrical properties, comparison between annealing, normalizing, hardening, tempering.</p> <p>4.2 Powder metallurgy: Importance & limitations, processes, electrical applications</p> <p>4.3 Power transmission & safety: Belt, rope, chain gear drives, tools, safety of personnel in the workshop.</p>	10	16
5	<p>5.1 Internal Combustion Engines & Turbines: Air standard efficiency of diesel & Otto cycle. Calculation of IHP & BHP, heat balance sheet, use of I C Engines for power generation.</p> <p>5.2 I C Engines: Construction & classification of I C Engines. Difference between two stroke & four stroke, petrol & diesel Engine.</p> <p>Operation of Diesel Engines, maintenance & faults.</p>	08	12
6	<p>6.1 Introduction to Industrial Hydraulics & pneumatic systems: Various components used, their functions, simple pneumatic & hydraulic circuits.</p> <p>6.2 Types of welding: fusion & pressure welding: electric resistance welding, Arc welding, gas welding.</p>	06	12

A) Practicals :

Skills to be developed:

i) Intellectual Skills:

- | | |
|--------------------|-------------------|
| a) Identify | b) Discrimination |
| c) Selection | d) Interpretation |
| e) Understanding | f) Reading |
| g) Design Approach | h) Report Writing |

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ii) Motor Skills:

- a) Proper connection
- b) Measurement
- c) Troubleshooting
- d) Testing
- f) Draw graph paper
- g) Observe the result and compare

List of Practical:

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.:

A) The term work shall consist of any ten experiments from the following

1. Study of diesel engine
2. Study of petrol engine
3. Study of Venturimeter
4. Study of Orifice
5. Study of Industrial Pneumatic components
6. Study of Industrial Hydraulics components.
7. Simple Hydraulic & Pneumatic circuit
8. Hardness testing of materials.
9. Study of pressure measuring devices.
10. Study of Pelton Wheel

B) Field Work:

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
01	O.P. Khanna	Material science & Metallurgy	Dhanapat & Co., New Delhi
02	V.D. Kodgire	Material science & Metallurgy	Everest Publications, Pune
03	R. K. Bansal	Fluid Mechanics	Khanna Publications, New

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			Delhi
04	Ramamrthumm	Strength of Materials	New Delhi Dhanapat & Co
05	Hajara- Choudhari	Workshop Technology	

B) Web sites for references:

1. www.howstuffworks.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Electrical Engineering Skills & Drawing

Course Code: R14EE 3303

Course Category : Core

Credits : 04

Teaching and Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
-	4	-	-	-	-	25@	50	75

Rationale: A student has to complete the following assignments so as to acquire some of the basic skills in Electrical work required in laboratory or in the industry. He is required to understand and interpret the drawing prepared by others.

Objectives:

The student should be able to

1. Connect the various meters as per the laws & convention of the electrical engineering
2. Suggest the meter, equipment, accessories for the connections as per requirement
3. Identify the equipment, meter rating, machine rating, & chose correct meter for use
4. Identify the symbols used in India in Electrical Engineering as per BIS
5. Draw & explain the power & lighting Circuits.

Term Work:

Skills to be developed:

i) Intellectual Skills

- Identify various types of instruments for various applications
- Discriminate the connection type
- Selection of proper instrument for a particular quantity
- Interpretation the results indicated by the instruments
- Understanding the correct methods of connections & the drawing the symbols
- Reading the drawing

ii) Motor Skills

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- i) Proper Connection
- ii) Finding out least count, Zero adjustment,

Part I: Electrical Engineering Skills

Twelve Assignments based on the following list.

1. Connecting D.C./A.C. ammeter & voltmeter as per circuit diagram.
2. Connecting wattmeter & energy meter as per circuit diagram & calculation of their multiplying factor.
3. Connecting single-phase transformer.
4. Connecting A.C./ D.C. motors.
5. Connecting a rheostat as Potential Dividers & as a variable resistance.
6. Connecting a frequency meter & power factor meter.
7. Study of types of wires & terminations by lugs & connectors.
8. Connecting Cable glands and understanding its Importance.
9. Wire jointing & soldering technique.
10. Use of Digital Multimeter, standard wire gauge and wire stripper.
11. Use of Megger, tong tester & earth tester.
12. Study of different tools in wiring.

Part II: Electrical Engineering Drawing

The term work shall consist of the following three drawing sheets of A2 size.

1. Symbols as per BIS for wiring, machines & power system components & any two circuit diagrams using these symbols.
2. Panel wiring diagrams of any two panels (Battery charger, domestic meter, pumps controller or similar type).

Professional Practice:

Visit to a location for Observing the Procedure for Cable jointing OR Showing Video/ Slides on Cable Termination and Jointing

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course : DC Circuits & DC Machines

Course code: R14EE3304

Course Category: Core

Credits : 06

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	25@	-	50	175

Rationale: In this course the student will understand the concept of electric circuits. This course will also help the student to learn various types of electrical circuits.

Objectives:

The student will be able to

1. Know the concept of laws applicable to electrical circuits.
2. Understand the theorems applicable to dc circuits.
3. Calculate various circuit parameters by applying laws & theorems.

Unit No	Topic and Contents	Hours	Marks
One	1.1 Fundamentals of Electrical engineering - Concept of Current, Voltage. Ohms law. Dot & Cross convention for current flow, Fleming's right hand rule, Fleming's left hand rule, Right hand grip rule [cork screw rule], Right hand grip rule for solenoid. 1.2 Concept of electrical work, power, energy with simple Numerical. 1.3 Electrostatics – Laws of electrostatics, unit of charge, electric field, electric field intensity, electric flux density, equipotential surfaces. 1.4 Capacitor and its mathematical expression, charging and discharging of capacitor. Series & parallel combinations of capacitor.	10	12
Two	2.1 D.C. Circuits - Network Terminology, Kirchhoff's laws, Loop & Nodal analysis, Cramer's rule method. 2.2 Ideal & practical voltage & current sources. Conversion of voltage & current sources. Delta to star & star to delta conversion. (Numerical based on these conversions)	08	12

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Three	DC Networks – 3.1 Mesh Analysis 3.2 Node Analysis 3.3 Superposition theorem, 3.4 Thevenin's theorem 3.5 Norton's theorem 3.6 Maximum power transfer theorem. (Numerical)	10	16
Four	4.1 D.C. machine construction & functions of various parts. 4.2 D.C. Generators – working, EMF equation & types. 4.3 Armature reaction & commutation in DC generator. 4.4 Remedies to reduce armature reaction and improve commutation (Numerical)	10	16
Five	5.1 D.C. Motors – Operation, torque equation, concept of back EMF. (Numerical) 5.2 Types & characteristics of DC Motors. 5.3 Armature reaction & commutation in DC Motor 5.4 Losses & efficiency calculations of DC Generator & Motor (Numerical)	09	12
Six	6.1 Starters for DC Motors – Construction and Working, Necessity of starters 6.2 Speed control methods for DC motors, Flux control and armature resistance control method. 6.3 Tests on DC Generators & Motors. 6.4 Design of Lap & Wave winding for DC machines.	09	12

Teaching Methodology: Chalk Board, PPT.

TERM WORK

A] Skills to be developed:

i) Intellectual Skills:

- Understand the basic concepts of the Electrical Engineering
- Interpretation of the various laws applicable to Electrical Engineering
- Ability to solve simple numerical problem
- Understand electrostatics & ac systems

ii) Motor Skills:

- Connecting the instrument as per given diagram
- Measure various quantities on various meters

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- Draw Graph of quantities indicated by meters
- Observe the Results and Compare
- Trouble Shooting & Testing the connections of the equipments & instruments

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments. -

1. To verify Ohm's law
2. To verify Kirchhoff's laws.
3. To verify the laws of Resistances in series & parallel
4. Verification of Thevenin's Theorem and Norton's Theorem.
5. Verification of Superposition Theorem.
6. Identify and constructional details of various types of D.C. Machines.
7. Internal & External, Characteristics of D.C. Shunt Generator
8. Magnetization Characteristics of D.C. Shunt Generator
9. Study of DC shunt Motor Starter and reversal of direction of rotation of DC Shunt Motor
10. Speed Control of D.C. Shunt Motor
11. Load Characteristics of D.C. Shunt Motor
12. Load Test on DC Series Motor.

Learning Resources:

Sr. No	Author	Title	Publication
1	Schaum Series	Network Analysis	McGraw Hill
2	B.L.Theraja	Electrical Technology Vol.-I and Vol II	S. Chand Publishing
3	B.H.Deshmukh	Electrical Engineering	Nirali Prakashan
4	B.P. Patil, A.S.Zope	Electrical Measurement & Network Theory	Vrinda Publication

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course : AC Fundamentals and AC Circuits

Course code : R14EE3305

Course Category: Core

Credits : 06

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	50	-	50	200

Rationale: In this course the student will understand the concept of Electric Circuits. The basic aim of the subject is that he student must learn the basic concepts, rules and laws of electric and magnetic circuits and practicals thereof. This subject felicitates the understanding of principles of and working of machines, instruments and equipments.

Objectives: The student will be able to

4. Know the concept of laws applicable to electrical circuits.
5. Understand the theorems applicable to ac circuits.
6. Calculate various circuit parameters by applying laws & theorems.

Unit No	Name of the Topic	Hours	Marks
One	1.1 Electromagnetism - Magnetic Field Produced by Current carrying conductor and solenoid. 1.2 Energy Stored in Magnetic Field(Derivation and Simple numerical) 1.3 Electromagnetic Induction – Relation between Electricity and magnetism, Faraday's Law of Electromagnetic Induction, Lenz's Law. Self and Mutual Inductance. Magnetisation curve and Hysteresis loop and losses. 1.4 Eddy Current loss (Simple Numerical to be solved)	08	12
Two	2.1 Single phase AC circuit elements R, L, C. and concept of impedance & reactance. 2.2 Simple one loop AC generator with explanation of generation of sinusoidal EMF. 2.3 Representation of a sinusoidal AC quantity by a wave diagrams and mathematical expressions. 2.4 Basic definitions of - cycle, frequency, time-period, amplitude, form factor, peak factors, RMS value, average value (Numerical)	10	16

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Three	<p>3.1 Concept of phase & phase difference & phasor diagrams for Voltage and Current.</p> <p>3.2 Performance of Series combination of R-L, R-C and R-L-C circuit on single phase AC supply, Concept of Power factor, lagging and leading condition. Resonance in Series Circuit.</p> <p>3.3 Impedance triangle, Active power, Reactive power and Apparent power, Power triangle, Phasor diagram (Numerical)</p>	08	12
Four	<p>4.1 Performance of Parallel combination of R-L, R-C and R-L-C on single phase AC supply.</p> <p>4.2 Concepts of Admittance , Conductance, and Susceptance, (No Derivations, only Numerical)</p> <p>4.3 Parallel resonance, Quality Factor.</p>	08	12
Five	<p>5.1 Three Phase AC Circuits – Advantages of poly-phase circuits over single phase circuit, Generation of three phases EMF, Phase sequence, Polarity, Types of three phase connections.</p> <p>5.2 Concepts of Balanced and unbalanced load, Line, phase, quantities and power in three phase system in Balanced Star and Delta Connected load, Interrelationship between Star and delta connected load system.</p>	10	16
Six	<p>AC Circuits and Network Theorems – (Enunciation, Derivations, and Simple Numerical)</p> <p>6.1 Source transformation (No Numerical)</p> <p>6.2 Norton's theorem</p> <p>6.3 Mesh Analysis</p> <p>6.4 Node Analysis</p> <p>6.5 T and Pi Network, Concept of Transients, Concept of initial condition and final condition in switching circuits consisting R, L, and C.</p>	08	12

Teaching Methodology: Chalk Board, PPT.

TERM WORK A] Skills to be developed:

- i) Intellectual Skills:
 - Identify
 - Discriminate
 - Select
 - Interpret
- ii) Motor Skills:
 - Draw Graph
 - Ability to make proper Connection
 - Accuracy in Measurement

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Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments. -

13. To plot a B-H curve for a ferromagnetic material and identify important parameters.
14. To determine the variations in values of inductance of variable air-gap inductor for different air-gap lengths.
15. To verify the laws of Capacitors in series & parallel.
16. To determine the relation between voltage, current and power for R-L series circuit
17. To determine the relation between voltage, current and power for R-C series circuit
18. To determine the relation between voltage, current and power of R-L-C series circuit and conditions for resonance.
19. To determine the relationship between Line values and phase values of voltage, current & power for a three phase balanced Star connected load.
20. To determine the relationship between Line values and phase values of voltage, current & power for a three phase balanced Delta connected load.
21. To determine the relation between voltage, current and power for R -L in series with C in parallel circuit and conditions for resonance.
22. To find out the parameters for T network.
23. To find out the parameters for pi network.

Learning Resources:

Sr. No	Author	Title	Publication
1	Schaum Series	Network Analysis	McGraw Hill
2	B.L.Theraja	Electrical Technology Vol.-I	S. Chand Publishing
3	B.L.Theraja	Electrical Technology Vol.-II	S . Chand Publishing.
4	B.H.Deshmukh	Electrical Engineering	Nirali Prakashan
5	B.P. Patil, A.S.Zope	Electrical Measurement & Network Theory	Vrinda Publication

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Electrical Workshop Practice

Course code : R14EE3306

Course Category : Core

Credits : 05

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
3	2	3	80	20	-	-	50	150

Rationale:

A diploma holder in Electrical Engineering will be involved in installation, operation, and maintenance and testing. This subject covers things which are needed in everyday application. Knowledge of various types of domestic appliances will be useful for maintenance, fault finding and testing of appliances.

The course contains Illumination fundamentals & related calculations, wiring and related calculation, wiring installation and testing.

Objectives:

The student should be able to-

1. Know various types of commonly used domestic appliances.
2. Understand the fault detection method of domestic appliances.
3. Understand the concept of Illumination & its fundamentals & study the various types of lamps & calculate no. of lamps for given situation.
4. Know various types of wiring.
5. Design & draw wiring installation.

	NAME OF THE TOPIC	Hours	Marks
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1	<p>1.1 Domestic Appliances: Advantages & disadvantages of electrical energy, Construction, Working, possible faults & their location. Maintenance of commonly used appliances e.g. electrical kettle, steam iron, storage water heater, electric toaster & hair dryer etc.(some of the appliances to be studied in practicals), Calculation of rating of a water heater, Standard specifications of appliances available in the market.</p> <p>1.2 Purpose of using appliances, components common to all appliances – various insulating materials, switches, timers, heating elements (properties & materials used for heating elements), thermostats. Bells & Bell indicators.</p> <p>1.3 Construction & working of Microwave oven, Room Cooler, and OTG [Oven Toaster Griller].</p>	09	16
2	<p>2.1 Motors used in appliances, General construction of these motors, Types of bushings and bearings. Necessity of earthing of the appliances. How a person is saved from getting an electric shock by providing earthing. Use of megger, multimeter & series test lamp for detecting various types of faults in the appliances.</p> <p>2.2 Fans: Types, construction & working of table & ceiling fans, Exhaust fan, standard specifications, and methods of speed control. Air movement at various places. Calculations of no. of fans at given location.</p>	06	12
3	<p>3.1 Illumination Fundamentals: Lux, lumens, and factors affecting Illumination, Illumination elements at various places. Calculation of Number of Lamps at given situation.</p> <p>3.2 Construction and working of G.L.S.(General light service) & Fluorescent lamp, Electronic choke, Calculation of lamps for the resident & commercial locations.</p> <p>3.3 LED lamps: Types Advantages , Disadvantages.</p>	09	16
4	<p>4.1 WIRING: Electrical symbols as per IS for wiring. Simple light and fan circuits. Schematic & wiring diagrams. Wiring systems & looping systems. Staircase & Godown wiring.</p> <p>4.2 Planning of wiring installation for small residence. Designing & drawing of electrical installation. Planning of switchboard for light & fan circuits using dimensions, preparing material list.</p>	06	12

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5	<p>5.1 Wiring Accessories: Switching, protecting, terminating & misc. devices. Types of wires. Methods of wiring. PVC casing & capping, PVC conduit wiring, concealed & surface conduit wiring.</p> <p>5.2 Procedure of all these wiring methods. Factors to be considered for selecting wiring methods. Comparison of wiring methods. Testing of wiring.</p>	06	12
6	<p>6.1 Special Appliances: Microwave oven, Washing Machine, and Emergency lighting system, Solar based house lighting system & fuzzy controller refrigerator</p> <p>6.2 Uninterrupted Power Supply(UPS) and calculation of Battery capacity</p>	06	12

TERM WORK

Intellectual Skill:

- Identify various types of instruments/equipments/appliances for various applications
- Select proper type of instrument to measure a particular quantity
- Interpret the results indicated by the instruments
- Understand the construction & operation of various instruments equipments/appliances.

Motor Skills

- Dismantling & assembling the home appliances
- Connecting the instrument as per given diagram
- Measure various quantities on various meters
- Draw Graph of quantities indicated by meters
- Observe the Results and Compare

The term work shall consist of the following -

1. Dismantling & assembly of the following appliances to understand the construction, working, fault finding & maintenance of various appliances and corresponding reports of it.
 - A) Any four out of the following appliances.
 - 1) Room heater
 - 2) Electric Heating Pad
 - 3) Immersion heater
 - 4) Electric Oven/Microwave oven

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5) Electric Bell / Door Chime

- B) Of the following appliances:
- 1) Simple & Automatic Toaster
 - 2) Geyser
 - 3) Simple & Automatic iron
 - 4) Washing machine
 - 5) Vacuum cleaner
- C) Fluorescent lamp
- D) Fan

2. To prepare an extension board consisting of not less than 5 wiring accessories. The student has to decide the plan.
3. To prepare a model wiring board using PVC casing and /or conduit method of wiring.

Professional Practice:

A group of 3 to 5 students should collect the information brochure of any one electrical appliance from market, prepare a comparative statement and should present it as a part of Term work.

Learning Resources:

A) BOOKS:

Sr. No	Author	Title	Publisher
1	S.L.Uppal	Electric Wiring, Estimating and Costing	Khanna Pub., New Delhi
2	B.D.Arora	Electric Wiring, Estimating and Costing	S. Kataria & Sons, New Delhi
3	K.B.Bhatia	Study of Electric Appliances	Khanna Pub., New Delhi
4	Anwani,Hans	Basic Shop Practice	-

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Measurement and Instrumentation

Course code : R14EE3307

Course Category : Core

Credits : 06

Teaching and Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	50	-	50	200

Rationale: Every part of engineering (design, construction, operation, installation, maintenance, testing) needs feedback that can be gained only through measuring the unknown quantities. This course will help a Diploma holder in Electrical Engineering to learn the basic principle, construction, operation & application of electrical measuring instruments. Also an electrical engineer has to deal with various types of instruments to measure various quantities like temperature, pressure etc. In this course the student will learn about operating principle, construction, operation, application & selection of various types of instruments used in Industries.

Objectives:

The student will be able to

1. Know the characteristics of various electrical measuring instruments.
2. Know the construction & working of various electrical measuring equipments
3. Know various methods for measuring various electrical quantities.
4. Understand the principle of instrumentation system & its characteristics.
5. Understand the construction & operation of various types of equipments and instruments.

Unit No	Topic and Contents	Hours	Marks
One	1.1 Necessity, classification of measuring instruments based on various effects of electric current, applications. 1.2 Characteristics of instruments – accuracy, sensitivity, precision, resolution, least count, drift, dead zone. 1.3 Types of errors – instrument, environmental, temperature, gross, ratio/phase angle error 1.4 General construction of Electrical Instruments- Production of deflecting torque, controlling, damping torque. Supporting Mechanism.	10	12

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Two	<p>2.1 Construction, working principle & operation of Permanent Magnet Moving Coil type, Moving Iron type [Attraction and Repulsion], Dynamometer type, Electromagnetic induction type of Instruments.</p> <p>2.2 Extension of range of Voltmeter, Ammeter by using Shunts, Multipliers, CT and PT, CT/PT Errors.</p> <p>2.3 Wattmeter – Measurement of power in 3 phase balanced & unbalanced load using 1, 2 & 3 wattmeter. Study of variation of wattmeter reading with change in power factor.</p> <p>2.4 Measurement of single phase power using instrument transformer. Measurement of reactive power using one wattmeter mater.</p> <p>2.5 Energy meter – Induction type (Single phase & Three phases). Calibration of single phase energy meter.</p> <p>2.6 Electronic energy meter (Block diagram)</p>	10	16
Three	<p>3.1 Measurement of resistance – Classification, Low resistance measurement by Kelvin’s Double Bridge, Medium resistance measurement by Wheatstone’s Bridge, High resistance measurement by Megger [Megger - Ranges and Applications] & Ohm meter.</p> <p>3.2 AC Bridges-Measurement of Inductance and Capacitance by LCR Meter.</p> <p>3.3 Other Measuring Instruments – Earth Tester, Multimeter, 1phase power factor meter frequency meter – Electric Resonance Type. Weston synchroscope, rotating type phase sequence Indicator, Tri-vector Meter.</p>	08	12
Four	<p>4.1 Introduction to basics of instrumentation.</p> <p>4.2 Types of Transducers for – Temperature, Pressure, Flow, Liquid level, Vibration, Acceleration, Displacement, and Speed & Illumination.</p>	08	12
Five	<p>5.1 Non – Destructive Testing [NDT] – Difference between Destructive and Non Destructive Testing, Advantages and limitations of NDT.</p> <p>5.2 Methods of NDT - Visual, Radiography [X-ray & Gamma ray], Magnetic particle, Ultrasonic, Eddy current.</p> <p>5.3 Radioactive Isotopes – Concepts of radioactivity, Types of radiations and their properties</p> <p>5.4 Instruments to detect the radioactivity</p> <p>5.5 Use of radioisotopes for measurements of Density, Thickness, Liquid level, Flow, Homogeneity of mixture, Leakage detection.</p>	10	16
Six	<p>6.1 Concept of signal Conditioning, Block diagram of AC and DC signal Conditioning and its working.</p> <p>6.2 OP-AMP – 741, Signal Conditioning using OPAMP, Working and Construction</p> <p>6.3 Filters – Types and Frequency Response, Multiplexing.</p> <p>6.4 Use of Signal Conditioning Circuits for Instrumentation System</p>	10	12

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

Teaching Methodology: Chalk Board, Discussions, Power Point Presentation
Term work:

A] Skills to be developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding
- Proper Connection
- Measurement
- Draw Graph

ii) Motor Skills:

- Observe the result and compare

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

1. Measurement of power in three phase circuits by two-wattmeter method.
2. Measurement of Reactive power in three phase load using one wattmeter method.
3. Calibration of Single phase Energy meter at different power factors.
4. Measurement of low resistance using Kelvin's double bridge..
5. Measurement of Capacitance by Desauty's bridge.
6. Measurement of Iron loss in a given core using Epstein's Square.
7. Measurement of Single phase power using C.T. & P.T.
8. Calibration of bimetallic thermometer and expansion thermometer.
9. To plot the characteristics of a RTD, thermocouple and Thermister.
10. Study of Strip / Circular chart Recorder.
11. Measurement of dielectric Liquid level using capacitor method
12. Measurement of Displacement using LVDT.
13. Measurement by Tri-vector meter of the max. Demand, kWh, RkVAH, kVAH, in a substation at your Institute.

Professional Practices:

The students have to collect Manufacturers literature / Brochures of any one type of Instruments used for Measurement of Pressure / Temperature / Liquid Level / Biomedical and prepare the comparison Chart pertaining to their specifications.

Learning Resources:

A. Books

Sr. No	Author	Title	Publishers
1	Jones	Instrument Technology Vol.1,2,3	Pitman Publications
2.	Beckwith & Buck	Mechanical Measurements	John Wiley Intr.
3.	R.K.Jain	Mechanical Measurements &	S.Chand & Co.

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		Instrumentation	
4.	A.K.Sawhney	Electrical Measurements and Instrumentation	Dhanpat Rai and Co
5	Golding E.W	Electrical Measurements & Measuring Instruments	Pitman Publishing
6	Rao H .V .S	Electrical Measurements & Measuring Instruments	-

B. Website

[www. omega.com](http://www.omega.com)

www. automaticicelecytricals.com

Professional Practice:

Students should visit a calibration laboratory & / Or manufacturing unit of measuring instruments or where above mentioned processes are carried out and write a report of the visit as a part of the above term work &/ or a guest lecture of an expert in the field of Electrical Measurement system may be arranged.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course : Electrical Power Generation

Course code : R14EE3308

Course Category: Core

Credits : 06

Teaching and Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25@	50	175

Rationale - An electrical engineer working in the field of project engineering and utilities should possess adequate knowledge of various methods of power generation and its economics.

Objective:

The student should be able to

1. Understand the concept of generation & Non-conventional energy sources.
2. Calculate load factor, diversity factor, plant capacity factor
3. Understand the functioning of various transmission line components.

Unit No	Topic and Contents	Hours	Marks
One	1.1 Basics of Power Generation, Importance of electric power generation in day to day life. 1.2 Types of fuels, Various energy sources, 1.3 Electrical power generation economics and types of Tariffs, Captive power Generation, Advantages and disadvantages, types of captive power plant 1.4 Co-generation,	10	12
Two	2.1 Thermal Power Plant – Introduction, Merits and Demerits, Site selection, Working, Constituents of Thermal Power plant: Turbine, Fuels[Coal, Oil, Gas] Fuel handling, Furnaces, Ash Handling, Draught System, Feed Water, Plant controls and Accessories, Turbo Alternators Exciter, Block Diagram, Economiser, Super Heater, Preheater, governer 2.2 Geo thermal Power Plant – Layout, Block Diagram, Working, Advantages and Limitations. 2.3 Gas Power Plant – Block Diagram, Merits and Demerits, Applications, Site Selection, Fuel, Various Elements, Plant Lay out, operation and control, Combined operation of Steam and Gas power plant	10	16
Three	3.1 Nuclear power plant – Nuclear physics – materials, Half life ,Fusion, Fission ,Isotopes Introduction, Merits and Demerits, Site Selection, Types of reactors-types, working, principle, application	08	12

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Four	<p>Concept, Block Diagram, Working, Advantages & Disadvantages Of the following</p> <p>4.1 Hydro power plant.</p> <p>4.2 Non Conventional Energy Sources.</p> <p>4.2.1 Ocean power plant.</p> <p>4.2.2 Wave power plant.</p> <p>4.2.3 Tidal power plant.</p> <p>4.2.4 MHD power plant.</p>	08	12
Five	<p>Solar Energy power plant –</p> <p>5.1 Importance, Solar radiations, spectral Distribution of radiations, Schematic representation of distribution of Solar energy as direct, diffused and total radiation, Definition and formula of Solar constant. Site section factors for the plant.</p> <p>5.2 Solar Collectors, Classification of collectors, Construction, working, applications, and comparison of Flat plate and Concentric type collectors.</p> <p>5.3 Schematic diagram of Solar power plant, Types of Solar power plant, Construction, Working, Advantages, Disadvantages of Solar Power Plant over PV System</p> <p>5.4 Solar PV System and Applications – Principle of Working and rating, Series parallel connections of PV cells and its necessity, Construction of Solar PV array, module and panel. Types of Solar Cells and its efficiency.</p>	11	16
Six	<p>Wind Energy Power plant –</p> <p>6.1 Concept of the power in the wind, maximum power, coefficient, forces on the blades, and thrust on the turbine. Types of Generators – Induction, Synchronous</p> <p>6.2 Site selection for the Wind power plant.</p> <p>6.3 Block Diagram of Wind power plant system with detail functioning of the each block</p> <p>6.4 Types of wind turbines, Horizontal and vertical axis wind turbine, schematic representation of different parts and their functions.</p> <p>6.5 Advantages and Limitations of Wind Energy.</p> <p>Diesel power plant</p> <p>6.6 Chemical energy sources: Fuel cells- principle of operation, construction, advantage and disadvantage</p> <p>Batteries – Different types of batteries used for bulk energy storage</p> <p>6.7 Additional Non-conventional Energy Sources: Thermoelectric and Thermionic power generation.</p>	09	12

Term Work:

Motor Skill: to be added

The term work shall consist of the following assignments –

The drawing sheets of A1 size any three of the following.

1. The schematic diagram of Thermal power plant with accessories
2. The schematic diagram of Nuclear power plant with types of reactors
3. The schematic diagram of solar and Wind power plant

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4. The schematic block diagram for Tidal / Wave, MHD, Geothermal Power plant and Gas power plant.

Professional Practice:

1. Students should visit to a Generating Power Plant and prepare a visit report of it as a part of above Term Work.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	V. K. Mehta	Principles of Power System,	S. Chand and company, N. Delhi
2	B. R. Gupta	Generation of electrical energy	TMH Publication,
3	M.V.Deshpande	Electrical Energy generation and transmission,	TMH Publication
4	Soni, Gupta, Bhatnagar	A text book on power system engg.	D. Rai and company Delhi.
5	J.B. Gupta	A course in Electrical Power	TMH Publication.

B) Web Sites:

1. www.mahagenco.com
2. www.alstomindia.com
3. www.udheindia.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course: LT& HT Switch Gear

Course code: R14 EE3309

Course Category: Core

Credits :06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rationale: An Electrical Engineering Diploma holder working in industries has to handle various types of low -tension and High tension switchgear like MCB, MCCB, Contactor, Vacuum and SF6 Switchgears. He should be aware of various specifications of these items for their selection. In this course the student learn about principle of operation, construction, working, maintenance & selection of various types of low tension switchgear.

Objective:

The student should be able to -

1. Understand the L T Distribution system.
2. Know uses of contactors, relays, circuit breakers, MCB.
3. Develop control system.
4. Select a starter as per the requirements of the applications.
5. Maintain Low Tension switchgear.

Unit	NAME OF THE TOPIC	Hours	Marks
1	<p>Classification of Switchgear based on Voltage level,</p> <p>1.1 Introduction to low tension Switchgear & its components. Typical L.T. distribution system in an industry. Power Control Centre[PCC] , Motor Control Centre[MCC], Power &Motor Control Centre[PMCC], Motor feeder & Switchboard</p> <p>1.2 Power & Control contactors: Broad definition, construction & operation, comparison with other switching devices with respect to current & mechanical life.</p> <p>Utilization categories, applications, arc extinction mechanism, selection of contactors, performance test, Pick up & drop off voltage measurement.</p> <p>Capacitor Duty Contactors, Vacuum Contactors.</p> <p>Troubleshooting – probable causes & possible solutions</p>	12	16

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2	<p>2.1 Relays. Classification, Overload relay- Thermal, Magnetic & Electronic: construction, operation & characteristics (IS 13947, PART -4)</p> <p>International Codes for relays [ANSI/IEC Standards].</p> <p>Working of Over-current and Earth fault relay and its current and time settings.</p> <p>2.2 Causes of overheating of motors & requirements of thermal relay. Setting of overload relay. Connection diagrams of relays (with &/or without C T)</p>	08	12
3	<p>3.1 Fuses, Switches & Combination Units: HRC fuses[LT and HT], definition, construction & operation. Various terms associated with fuses. Selection of fuses.</p> <p>3.2 Switches – various types, specifications & applications, automatic changeover switch.</p> <p>3.3 ELCB types (Number of Poles and Current Sensitivity) and Selection</p>	08	12
4	<p>4.1Air Circuit Breaker, MCCB and MCB: Definition & necessity of circuit breakers. Arc Phenomenon. Arc extinction method in L.T.C.B., Construction & Operation of L.T.C.B, comparison & selection.</p> <p>4.2 kVAR Compensation by capacitor banks- Methods. Automatic power factor improvement unit</p>	08	12
5	<p>HT Switchgear:</p> <p>5.1 Operation, Maintenance. and Applications of following HT Switchgear :</p> <p> 5.1.1 Vacuum circuit breaker and SF6 circuit breaker.</p> <p> 5.1.2 Ring-Main Switches</p> <p>5.2 Breaker Rating: - Rated Voltage, Rated Frequency. Rated Symmetrical Braking Capacity, Rated asymmetrical. Braking Capacity, Rated making capacity, rated short time current of -1 seconds & 3 seconds, Rated operating duty cycles.</p> <p>(Simple Numerical)</p>	12	16

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6	<p>6.1 Functions of protective system.</p> <p>6.1.1 Normal & abnormal conditions.</p> <p>6.1.2 Types of faults & their causes.</p> <p>6.1.3 Short circuit calculations(Symmetrical faults only)</p> <p>6.1.4 Use of current limiting reactors & their arrangements</p> <p>6.2 Control & metering circuits-Difference between power circuit & control & metering circuits, diagrams for power circuit & control & metering circuits</p> <p>6.3 Components used in control & metering circuits Indicating meters used for different measurement</p> <p>6.4 CT & it's connections in control circuits. Rotary switches,[selector switches] Push buttons, Timers, Indicators Limit switches, Hardware used in control panels.</p>	08	12
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Teaching Methodology: Chalk Board, Power Point Presentation, Discussion

Term work :

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding

ii) Motor Skills:

- Proper Connection
- Measurement
- Draw Graph
- Observe the result and compare

The term work shall consist of following assignments.

A] List of the practical

1. Study of contactors
2. Performance test of a contactor
3. Testing of MCB
4. Study of ACB
5. Connections of CTs for ammeter change over switch.
6. Setting a Thermal timer & measuring its operational time.
7. Testing of ELCB
8. Study of Limit Switches.

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B] Assignment on Drawing and explanation of Control Panel Circuit. [Motor Control Centre or Power Control System]

C] Two assignments- Drawing & explanation of connection diagrams of control panel circuit.

Professional Practice:

1. Student should visit a Switchgear training centre and prepare the visit report for the same as a part of the Term work.
2. Student should collect the data sheets for various L.T. and HT switchgears components and make Comparative statement and present as a report as a part of the term work.
3. Collect data and draw single line diagram of HT metering kiosk.

Learning Resources:

A] Books

Sr. No	Author	Title	Publisher
1	Rexford K.B.	Electrical Control of Machines	Delmar Pub.
2	Eswar U.S	Handbook of Motor Control System	TMH Pub lication.
3.	S. Rao	Switchgear and Protection	Khanna Publications
4.	Nil	L & T Motor Starter Handbook	Larson & Tubro

B] Magazines: 1. Electrical India 2. IEMA review

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course : Transformers

Course Code : R14EE4301

Course Category : Applied

Credits : 06

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	50	-	25	175

Rational: In every field of Electrical Engineering such as utilization, transmission & distribution of electrical energy the transformers are needed. The knowledge about Transformers is essential for an Electrical Engineer. In this course the student will acquire knowledge about the working principle of Transformers, their construction, performance characteristics, operation, tests, special features & applications

Objectives:

The student should be able to

1. Calculate various parameters related with performance of Transformer.
2. Explain the working of special transformers & 3 phase Transformers.
3. Conduct various tests on transformers & analyze the results.
4. Know the design procedure of a Distribution Transformer

Unit No	Topic and Contents	Hours	Marks
One	1.1 Concept of Electromagnetic Induction. Self Induced EMF & Mutually Induced EMF. 1.2 Constructional details of transformer and transformer mountings, Working principle of Transformer, Necessity of transformer. 1.3 General classification of transformer.	08	12
Two	2.1 EMF Equation of transformer & derivation, voltage & current ratios, 2.2 Concept of No load & on load of transformer. Rating of transformer 2.3 Ideal transformer – on load, no load, with phasor diagram, Practical Transformer on load, no load, with phasor diagram. 2.4 Equivalent Circuit of Transformer (Development from equivalent circuit diagram of Ideal Transformer).	10	16
Three	3.1 Losses in Transformer – Copper losses, Hysteresis losses, Eddy current losses, measures to reduce these losses. 3.2 Efficiency of transformer. All day Efficiency.(Numerical). Voltage Regulation, Degree of loading. 3.3 Design of single phase Transformer – core design, winding design	08	12
Four	4.1 Tests on transformer – 1] Direct loading 2] O.C. & S.C. 3] Back to back test & 4] polarity test. 4.2 Conditions for satisfactory Parallel operation of two identical	10	16

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	single phase transformer, Load Sharing , % Impedance. 4.3 Tap changing transformer – (Numerical) Need of tap changing. Process of tap changing. Types of tap changers: ON load tap changer type[OLTC] and open circuit tap changer [OCTC]		
Five	5.1 Three phase transformer - Three 1phase transformer banks, 3 phase transformer. 5.2 Three phase transformer connection – Y-Y, D-D, D-Y, Y-D, Open delta (V-V), Scott connection, Vector Groups. 5.3 Protection of Power Transformers – Types of faults, causes, effects and remedies. Over current and earth fault protection, Buchholz relay, winding temperature protection, percentage differential protection, problem arising and their solution, pilot wire current calculation and CT ratio. 5.4 Parallel operation of 3 phase transformers: Conditions for Parallel operations [significance of Vector Group], load sharing, % Impedance.	10	12
Six	6.1 Special purpose transformers- Auto transformer, Oil filled transformer, Cast resin Transformer, Amorphous core transformer[Star Duty Transformer], Ferrite core transformer, Welding Transformer, Isolation Transformer, Instrument Transformers, furnace transformer. Reactors, Earthing transformer, Control Transformer 6.2 Insulations used in transformer. Like oil, resins etc.	10	12

Teaching Methodology: Chalk Board, Discussions, Power Point Presentation

Term work:

A] Skills to be developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding

ii) Motor Skills:

- Proper Connection
- Measurement
- Draw Graph
- Observe the result and compare

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

1. Polarity test of Single phase transformer.
2. Verification of transformation ratio of single phase transformer.

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3. Direct loading test of Single phase Transformer
4. O.C. / S.C. test of Single phase Transformer
5. Back to Back test on Single Phase transformer.
6. Parallel operation of Single phase transformers.
7. Parallel operation of Three phase transformers
8. Study of three phase transformer connections.
9. Design of core for single phase transformer.
10. To determine the efficiency of single phase auto-transformer and single phase two winding transformer.
11. Scott connection of the Transformers.
12. Open Delta Connection of Transformer.
13. Study of Buchholz's relay.
14. Study of Sumpner's Test.

Professional Practice:

1. Students should visit Transformer Manufacturing Unit; write the visit report and submit it along with above Term-work.
2. An Expert lecture on the topic related with transformer manufacturing and prepare a lecture report.

Learning Resources:

Sr. no	Author	Title	Publiser
1	M.G. Say	Performance & Design of A.C. Machines	CBS Publications, New Delhi
2	B.L. Theraja	Electrical Technology (Volume II)	S.Chand & Co, New Delhi
3	B.H. Deshmukh	Electrical Technology	Nirali Publications, Pune
4	H.Cotton	Electrical Technology	Pitman Publications

Resources :Related IS

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : A.C. Motors & Generators

Course code :R14EE 4302

Course Category : Applied

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	50	-	50	200

Rationale: A diploma holder in Electrical Engineering has to deal with A.C. Motors & Generators in his career for various aspects like operation, selection, maintenance. In this course student will acquire knowledge about construction, working principle, performance characteristics, operation & control of A C Motors, Alternators, Special purpose A.C. motors.

Objectives:

The student will be able to

1. Know the working principle , construction & operation of Induction motor (3 phase & 1 phase), synchronous motor, servo motor, hysteresis motor, universal motor, reluctance motor.
2. Calculate the parameters of 3 phase induction motor such as slip, frequency, efficiency, torque, speed regulation, & parameters of equivalent circuit.
3. Draw circle diagram of 3 phase induction motor & analyze it.
4. Calculate the various parameters of 3 phase alternator.
5. Understand the effects of parameters on performance of alternator & synchronous motor.
6. Know about various methods of starting of induction & synchronous motors.

	NAME OF THE TOPIC	Hours	Marks
1	<p>1.1 Three phase Induction Motor- Introduction, production of Rotating Magnetic Field (RMF), conditions for production of RMF, Principle of working of 3 phase Induction Motor relation between speed, number of poles & frequency.</p> <p>1.2 Constructional parts & features. Types of 3 phase Induction Motor, rotor frequency, rotor emf, rotor current and rotor p.f. under no-load condition & in running condition.</p> <p>1.3 Factors determining torque, relation between full load torque, standstill torque, full load torque. Relation between rotor Cu loss, rotor output, and rotor input. Power flow diagram, efficiency (Numerical)</p> <p>1.4 Energy Efficient Motors: latest stds[.IE2, IE3]</p>	08	12

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2	<p>2.1 Torque-Slip Characteristics, methods of improving starting torque in Slip Ring & Squirrel cage Induction Motor as generalized a Transformer.</p> <p>2.2 Equivalent circuit & phasor diagram of three phase Induction Motor Determination of performance characteristics of 3 phase Induction Motor by load test, Light run & blocked rotor test. Determination of various quantities from circle diagram (Numerical)</p>	12	16
3	<p>3.1 Necessity of starters, for 3-phase Induction Motor. Study of Direct On Line & Star-Delta starter,</p> <p>3.2 Methods of Speed control of 3 phase Induction Motor including electronic control. Applications of three phase Induction Motor & voltage frequency & rotor resistance.</p>	08	12
4	<p>4.1 Synchronous Machines – Introduction, Construction & working principle of Alternator, EMF equation of Alternator</p> <p>4.2 Armature winding of 3 phase machines. Pitch factor, Distribution factor, Synchronous Reactance, and phasor diagram of Alternator. Voltage regulation (Numerical) Armature Reaction</p>	08	16
5	<p>5.1 Alternator- operation of Alternator. Effect of change of Excitation & Input parameters on Alternator performance, parallel operation, infinite bus-bar, power angle, synchronizing power, sharing of load.</p>	10	12
6	<p>6.1 Single phase motors- Introduction, classification, construction, principle of operation, performance characteristics, a applications.</p> <p>6.2 Repulsion start induction run, capacitor start & capacitor run, two-value capacitor, Shaded Pole motors</p> <p>6.3 Single phase Synchronous motors- Reluctance, Hysteresis, Universal motor, Stepper motor & Servomotor –construction and working and Applications.</p>	08	12

Teaching Method: Chalk Board, Power Point Presentation, Slides

Term Work:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding

ii) Motor Skills:

- Proper Connection
- Measurement
- Draw Graph
- Observe the result and compare

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Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

[All the experiments should be done as per IS wherever possible]

1. Study of 3 phase induction Motor Starters by starting the same motor by different starters. .
2. Reversing of Direction of rotation of three Phase Induction Motor
3. To calculate efficiency and regulation by Direct loading of three phase Squirrel Cage Induction motor.
4. Slip Measurement of three phase Slip Ring Induction motor
5. N-T characteristics of three phase Slip Ring Induction Motor.
6. Light run & Blocked rotor test on 3 phase Squirrel Cage Induction motor
7. Load test on 1 phase Induction motor
8. Starting & reversal of Single Phase induction motor & determination of no load power factor.
9. Direct loading test of 3 phase Alternator
10. O.C. / S.C. Test on 3 phase Alternator

Professional Practice:

Students should visit a manufacturing/ repairing unit of Induction Motor/ Alternator and write a report and submit it with above term work. They should also collect the information brochures regarding Electrical Motors/ Alternators of various manufacturing Company as a part of Term work.

Learning Resources:

SR. NO	AUTHOR	TITLE	PUBLISHER
1	M.G. Say	Performance & Design of A.C. Machines	CBS Publications, New Delhi
2	B.L.Theraja	Electrical Technology (Volume II)	S. Chand & Co, New Delhi
3	Nagrath & Kothari	Electrical Machines	Tata McGraw Hill Co., New Delhi
4	S.K. Bhattacharya	Electric Machines	TTTI, Chandigarh
5	H.Cotton	Electrical Technology	Pitman Publications
6	Ashfaq Hussain	Electrical Machines	Dhanpat Rai & Co. Delhi.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Electrical Design & Drawing

Course code: R14EE 4303

Course Category: Applied

Credits : 02

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
-	2	-	-	-	-	50	25	75

Rationale:

A diploma holder in Electrical Engineering is supposed to have good knowledge of designing. Student is required to understand and interpret the drawing prepared by others. Student should have knowledge & familiar with the Earthing methods as per Indian Standard about the schematic diagram of Starters and winding diagram of Electrical Machines. Designing of Distribution Transformer is also expected from the students.

Objectives:

The student will be able to

1. Understand the methods of earthing as per BIS.
2. Draw & interpret the diagrams of equipments like starter
3. Draw & interpret the winding diagram of electrical machines
4. Design & draw the details of assembly of a distribution transformer

Term Work:

i) Intellectual Skill:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding
- Reading
- Design Approach
- Report Writing

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List of Practical/Experiment/Assignment:

The term work shall consist of following.

4 Numbers of A1 size drawing sheets on the following topics.

Student has to do any two sheets using computer software [AutoCad] and remaining two sheets by using hand drawing.

1. Earthing systems as per BIS for
 - a. Plate Earthing
 - b. Pipe earthing
2. Winding diagram for 3-phase A.C Machine with coil connection diagram with calculation report.
3. Schematic diagrams of Automatic star-delta starter, D.O.L starter, Rotor resistance starter with protective devices
4. A student has to design a distribution transformer as per given data and draw a sheet to the scale as per the design. A detailed design report should be submitted.

REFERANCE BOOKS:

Sr. No	Author	Title	Publishers
1	Bhattacharya	Electric Engineering Drawing	TTTI, Chandigarh
2.	Narang,	Electric Engineering Drawing	TMH, New Delhi
3.	A.K.Sawhney	Course in Electric Machine Design	Dhanpat Rai and Co. New Delhi.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name: Utilization of Electrical Energy
Course Category : Applied

Course code: R14EE 4304
Credits : 03

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
3	-	3	80	20	-	-	-	100

Rationale: It is expected that the Diploma Holder in Electrical Engineering has to deal with number of electrical equipments in the Industry from the various aspects like operation, maintenance, testing etc. For this he should have the basic knowledge about the construction & operation of this equipment. In this course the students will learn about the various modes by which electrical energy is utilized in industries, through various equipment for heating, welding, illumination etc.

Objectives:

The student should be able to

1. To understand the electrochemical processes & operation of equipment used for these processes.
2. To be able to calculate the quantity of material deposited and efficiency from the given data.
3. To understand the working principle, construction, operation, characteristics, applications of the halogen lamp, sodium vapor lamp, neon lamp, mercury vapor lamp.
4. To understand the basic principles of electric welding & heating.
5. To be able to calculate the dimensions of the heating elements energy, efficiency from the given data.
6. To know about various drives used in the industry & their characteristics & the factors to select drive for particular operation.
7. To be able to calculate the RMS value & to design starter.
8. To know about system of traction in India, equipment used for them, their construction & operation.
9. To be able to calculate the tractive force, energy consumption, torque, power & speed.

	NAME OF THE TOPIC	Hours	Marks
1	Automobile Electrical Systems : Electrical components used for 2 wheeler & 4 wheeler automobiles like batteries, magnetos, contact breakers, ignition coils, cut outs, voltage & current regulators spark plugs, various types of lamps, alternators and dynamos, connection	10	12

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	diagrams of these components.		
2	<p>Batteries- Types, Comparison, Construction, working, Charging discharging of all types of batteries.</p> <p>Types of connections and maintenance and applications of various types of batteries</p>	10	12
3	<p>Electrical Heating & Melting: Introduction, advantages, disadvantages & applications, modes of transfer of heat, heating element materials & design, losses, efficiency (Numericals).</p> <p>Temperature control of resistance oven / furnaces, causes of failure of heating element, electric heating methods: resistance heating, salt-bath heating & infra red heating, arc furnaces, power supply & control.</p> <p>Induction heating: direct core, indirect core, vertical core & coreless induction furnaces (Numericals). High frequency power supply sources, high frequency eddy current heating.</p> <p>Dielectric heating (Numericals).</p> <p>Choice of frequencies for induction & dielectric heating.</p>	12	16
4	<p>Electrical Welding: Introduction, requirements of good weld. Advantages, disadvantages & applications. Types of electrical welding processes / equipment. Types, equipments, operation, characteristics, advantages, disadvantages & applications of electric resistance, electric arc, ultrasonic, electron beam & laser beam welding. Power supply for resistance & arc welding.</p> <p>Electric Drives: introduction, types of drives, types of loads, advantages, disadvantages, applications & characteristics of group, individual & multipurpose drives, selection of electric drive, load torque-time characteristics, factors governing selection of electric motor, types of enclosures, heating & cooling curves, ratings of machines, methods for calculations of kW of motor for given load cycle (numericals on rating). Load equalization, motors for particular services, applications of electric drives.</p>	10	12
5	<p>Electric Traction: Introduction, different systems of traction, systems of electric traction.</p> <p>Power Supply for Electric Traction: Introduction, systems of track electrifications, current collecting systems (conductor rail system</p>	12	16

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	<p>&over head system).</p> <p>Train Movement & Energy Consumption: Introduction, speed-time curves (Numericals). Mechanics of train movement (Numericals). Specific energy output & specific energy consumption</p> <p>Controls of Traction Motors: Starting & speed control of dc series (traction) Motor. Rheostatic control, series-parallel, field control, M-G locomotive control, diesel-electric locomotive control, transition methods, drum controller, contactor type controller, buck & boost method, thyristor control.</p> <p>Starting & speed control of 1-phase ac series motor.</p>		
6	<p>Electric Traction: Electric Braking: Requirements, Plugging, Rheostatic braking, regenerative braking, their advantages & disadvantages, energy returned during regenerative braking, mechanical regenerative braking. Working of Magnetic track brakes, eddy current brakes. Multiple Unit Control.</p> <p>Mechanical Power Transmission in Locomotives: Types, transmission arrangement in individual & collective drives.</p> <p>Traction Substations: Transmission systems, substation for 1-phase ac railways, location of substations, feeding & distributing systems, block diagram of an A.C. locomotive. AWTTTC, overlaps, neutral section, section insulators.</p>	10	12

Teaching Methodology: Chalk Board, PPT.

Professional Practices:

Visit to loco shed / industry manufacturing heating / welding unit. Literature survey.

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Learning Resources:

Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Taylor E. O	Utilization of Electrical Energy	TMH, edition.
2	Partab H	Art & Science of Utilization of Electrical Energy	
3	Soni, Gupta & Bhatnagar	A Course in Electrical Power	Dhanpar RAI and Sons, Delhi.
4	Uppal S. P	Electrical Power	
5	Partab H	Modern Electrical Traction	
6	Sayyed B. C.	Utilization of Electrical Energy	

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Electric Motor Control
Course Category : Applied

Course code : R14EE 4305
Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	50	25	150

Rationale: In the sophisticated industries, an electrical engineer is expected to work on the drives run by the electric motors, which have different working characteristics. Student has to deal with the electric as well as electronic control of AC and DC motors. In this course the students will learn about the various types of the electrical drives and undergo the various methods of control through the electrical as well as electronic circuitry. Student will also learn about various components used for motor control and revise the various AC and DC motors characteristics.

Objectives:

The student should be able to -

1. Understand the importance of the electric drives over the other drives & the various concepts related to the drives.
2. Understand the various methods of controlling the induction motor & its starters
3. Know the various methods of starting & stopping of the motors
4. Know the importance of the electronic speed control
5. Understand the safety measures of the motors & drives

	NAME OF THE TOPIC	Hours	Marks
1	Types of Drives, Advantage of Electrical Drives over other drives. Four-quadrant operation of drives. Solar battery power drives. Types of industrial loads. Revision of Speed-Torque Characteristics of various types of electrical motors. Stability of Drives Motor Control Devices: Manually operated Switches, Mechanically operated Switches, Sensors and Actuators in MCC, PMCC.	09	12

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2	<p>Starting characteristics of Induction Motor. Effects of starting current on power lines, motor & load. Need of reduced voltage starting, methods of reducing voltages, their advantages & disadvantages. Induction motor starter: DOL, Starter with thermal relay. Forward-Reverse control circuit & operation. Interlocking circuits of contactor. Star delta starters Manual Semi automatic and Automatic types, their circuits and operations. Soft starters for induction Motor, Operations and their advantages. Nano-Ganesh starter.</p>	09	12
3	<p>Electromechanical and electronic starter & control circuit for D.C. Motor, Current limit acceleration starters for shunt motor, Jogging of DC Motors. Soft starters for AC & DC motors. Principle for Electronic control for controlling the speed of DC Motors, DC Motor Control Through Choppers, Cycloconverters Electrical braking of DC motors: - Types of braking of DC motors- Regenerative [Rheostatic braking] & Plugging.</p>	10	16
4	<p>Principle of Electronic speed control for AC motors: Schematic diagram of electronic speed controller. Variable Frequency drive: - Block diagram, Working and application. V/F control: - Block Diagram, Working and Applications. Introduction to Voltage Source Inverter, Current Source Inverter, Static Scherbius drives, Static Kramer drive : Circuit diagram working and their applications. Plugging & Dynamic braking of 3 phase induction motors</p>	10	16
5	<p>LIM –Construction , Working and application as drive, CNC control for machines. Study of Static and electromechanical relays and revision of various types of Control Circuit components like contactors, push buttons and selector switches Control circuits for lifts and conveyors</p>	09	12
6	<p>Study of single phasing preventer. Study of voltage stabilizer for three & single-phase supply. Study of Electromechanical brakes ,Study of electromagnetic clutches-advantage of using clutch BLDC Motors Construction, working and applications Printed Circuit motors – Construction, working and applications.</p>	09	12

Teaching Methodology: Chalk Board, Discussions, Power Point Presentation

Skills to be developed:

i) Intellectual Skills:

ii) Motor Skills:

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1. Identify
 2. Discrimination
 3. Selection
 4. Interpretation
compare
 5. Understanding
 6. Reading
1. Proper Connection
 2. Measurement
 3. Draw Graph
 4. Observe the result and

Term work:

A] List of the practical:

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

1. To understand the construction and working of Automatic star-delta starter.
2. To understand the construction and working of automatic reduced voltage starters for DC Shunt and Series motor.
3. To plot braking characteristics of DC motor by Plugging
4. To plot braking characteristics of DC motor by Rheostatic method.
5. To plot braking characteristics of AC motor by Plugging Method.
6. To plot braking characteristics of AC motor by Dynamic Breaking Method
7. To understand the operation of Voltage operated single phasing preventer and Current operated single phasing preventer.
8. To perform the Electronic speed control for AC and/ or DC motors and plots the characteristics. [V/f Method and /or Chopper Method].
9. To understand the construction and working of the Electromagnetic Brakes
10. To understand the construction and working of the of Electromagnetic Clutches
11. To study the various types of stepper motor.
12. To study the types, Construction, working & applications of BLDC Motor.

B] Student/group of student will visit the firm/unit where various types of drives are used such as paper printing mill, small manufacturing unit]and will prepare the visit report.

Books:

SR. NO	AUTHOR	TITLE
1	Siskind C	Electrical Motor Control
2	Pillai	Industrial Drives
3	Iswer	Electrical Motor Control
4	Vedam Subramanyam	Electric Drives
5	Bimal K. Bose	Modern power electronics and AC drives
6	Electrical Drives	Ali Emadi
7	Gopal K. Dubey	Fundamental of electric drives
8.	Frank D. Petruzella	Electrical Motors and Control Systems
9.	Stephen L. Harman	Electric Motor Control

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course Name : Industrial Electronics

Course code : R14EX 4306

Course Category : Applied

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	-	50	150

Rationale:

A diploma holder of Electrical Engineering has to deal with Electronic components as every Electrical System for the purpose of control or application. In this course the student will learn about the Inverters, SCRs as controllers, Counters, Regulated power supply & various types of resistance welding.

Objectives:

The students will be able to

1. Describe the working of SCR.
2. Understand various speed control methods.
3. Draw Digital circuits.
4. Understand the Regulated power supply.
5. Know resistance welding, induction heating, dielectric heating.
- 6.

	NAME OF THE TOPIC	Hours	Marks
1	1.1 SCR-Introduction to SCR, V-I Characteristics, SCR as a controlled rectifier, Control rectifier half wave using R-L load. Control rectifier FWFC using R & R-L load. Different Triggering methods of SCR, using R, RC & UJT. 1.2 Commutation- Forced & natural commutation methods. Methods of commutation: Class A, Class B, Class C, Class D, Class E, Class F 1.3 Temperature control circuit using SCR . SCR specification., Operation, & Waveform.	12	16

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2	<p>2.1 Motor Control- soft start circuit, requirement & simple circuit operation.</p> <p>2.2 Speed control of D.C. Shunt motor using SCR with using armature voltage control & field current control.</p> <p>2.3 Speed control of A.C. motor using SCR, circuit diagram & operation. Different techniques used for control of motors.</p> <p>2.4 Counters types- Block diagram, asynchronous & synchronous counters. Divide by N counter.</p>	10	12
3	<p>3.1 Introduction to electronics timer, Basic principle of operation, advantages over other conventional timers. Different types of timers using BJT, UJT, and SCR. Schmitt trigger circuits using transistors. Introduction to Multivibrator.</p> <p>3.2 Number system : Binary, BCD, Decimal, Octal, hex, code conversion techniques.</p> <p>3.3 Integrated circuit. Circuit concept of IC's. Classification of IC's:- SSI, MSI, LSI, VLSI, ULSI. Comparison between analog & digital IC's & their specification.</p> <p>3.4 Logic gates. Symbol, truth table of all basic gates: AND, NOT, NAND, NOR, EXOR. Flip-flops: RS, JK, T & D TYPE, master slave, FF their symbol, truth table & race around condition.</p>	10	12
4	<p>4.1 Digital Multimeter- block diagram, application & comparison with analog multimeter.</p> <p>4.2 Servo Mechanism. Introduction of open loop system & closed loop system.</p> <p>4.3 CRO, block diagram of CRO. Measurement of electric quantity & application. Basic parts of servomechanism, block diagram & working, applications.</p> <p>4.4 Introduction to Inverters- types, using SCR, BJT Series Inverters, parallel inverters, operation, & waveform.</p>	12	12

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5	<p>5.1 Regulated power supply: Zener regulator, series, shunt type using transistor.</p> <p>5.2 Variable voltage regulator using IC 723, Specification 7 pin-out diagram. Different modes of operation using IC 723.</p> <p>5.3 A.C.Voltage Stabilizer- block diagram, specification.</p> <p>5.4 Solid state & servo stabilizer block diagram & comparison.</p> <p>5.5 IC 555- block diagram specification, application, description & pin configuration. Astable, monostable & Schmitt Trigger using IC 555.</p>	10	12
6	<p>6.1 Introduction of Microprocessor Architecture of 8085</p> <p>6.2 PIN Diagram Control Signals, Multiplexing of Address and Data BUS</p> <p>6.3 Introduction of Microcontroller, Comparison between Microcontroller and Microprocessor</p>	12	16

Teaching Methodology : Chalk-Board, Group Discussion, Power Point Presentation, Transparency,

Expert Lectures.

TERM WORK:

Skills to be developed:

i) Intellectual Skills:

- Identify
- Selection
- Understanding

ii) Motor Skills:

- Proper connection
- Measurement
- Testing
- Observe the result and compare

List of Practicals / Assignments / Experiments.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

Minimum eight (08) experiments are to be performed from the following list. It is expected that the staff member should conduct one or two additional self designed experiments.

1. Study of Logic Gates
2. IC 555 in astable/ monostable mode
3. Study of SCR firing circuits
4. Study of controlled rectifiers.
5. Study of parallel Inverter.
6. 78XX & 79XX as Voltage Regulator
7. Series pass transistor voltage regulator
8. IC 723 as voltage regulator
9. Study of counters
10. Study of Flipflops
11. Study of CRO/DVM
12. Demonstration and study of Microcontroller Kit
13. Demonstration and study of 8085.

Learning Resources :

A) Books:

SR.NO.	AUTHOR	TITLE	PUBLISHER
1	Millman & Halkies	Elements of Electronics	Prentice Hall of India, New Delhi.
2	V.K.Mehta	Principles of Electronics	S. Chand & Co., New Delhi
3	Ramesh Gaonkar	Microprocessor, Architecture, programming and application with 8085	Penram International Publishing(India) Pvt. Ltd.
4	P.S. Bhimbra	Power Electronics	Dhanpat Rai & Co., New Delhi.

B) Magazines :

- Electronics for you.

C) Web sites for references:

- www.en.wikipedia.org
- www.electronics-tutorials.com
- www.indianscientificinstrument.com
- www.alldatasheet.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME: ELECTRICAL ENGINEERING

Course: Transmission Distribution and Protection of Power System

Course code: R14EE4307

Course Category: Applied

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	50	50	200

Rationale - An electrical engineer working in the field of project engineering and utilities should possess adequate knowledge of various methods of power transmission and power distribution considering the economics of the system. In this course the student learn about the equipments involved in methods of transmission and distribution along with the protection of the power system.

Objective: The student should be able to

4. Know about various concepts like load factor, diversity factor etc. & methods of calculating the electricity bills using various tariffs.
5. Understand the functioning of various transmission line components as well as distribution system adopted by service provider.
6. Create awareness about the methods of power factor improvement & advantages of interconnected grid system etc.
7. Know about the various methods of the transmission systems & advantages of HVAC and HVDC
8. To understand the various protection schemes utilized for Transmission and Distribution systems to maintain the stability and supply continuity.

Unit No	Topic and Contents	Hours	Marks
One	1.1 Layout of Transmission and Distribution System, Advantages of HV transmission System, 1.2 HVDC Transmission System – Block Diagram, Functioning, Merits and Demerits, Comparison of HVAC and HVDC, 1.3 Comparison of single phase & three phase supply system, Comparison of 3 phase 3 wire & 3phase 4 wire system used in Transmission and Distribution systems.	07	12
Two	Support and Insulators for Transmission and Distribution lines – 2.1 Line support, Conductor material, Cross arms, Guys and Stays, Conductor Configuration, Spacing and clearance, Span Lengths, Sag, Sag Templates. 2.2 Line Insulators – Material, Types of Insulators, Failure of Insulators, Testing of Insulators, Distribution of potential over string of suspension insulator, Methods of Improving String	07	12

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	Efficiency 2.3 Corona, Factors affecting the Corona, Advantages and Disadvantages of Corona, Corona Power Loss, Methods of reducing Corona Effect		
Three	3.1 Types of Transmission Lines – Short, Medium and Long Transmission Line. 3.2 Skin Effect, Line Inductance, Inductance of 3 phase overhead lines, Bundled Conductors, Proximity Effect, Capacitance of Transmission Line for 1 phase and 3 phase System, Ferranti effect 3.3 Performance of short Transmission lines, Transposition of the lines used for Transmission 3.4 Underground Power cables – Need of Cable system, Types of various cables, construction, Selection Parameters, laying methods, Cable jointing. 3.5 Substations: Introduction to Gas Insulated Substation	10	16
Four	4.1 Distribution – Different lay outs, Radial Type and Ring main Type system for distribution 4.2 AC Distributers fed at one end and both ends, Stepped or Tapered Distributer, Ring Main Distributer. 4.3 AC Distribution – Introduction, AC Distribution Calculation, AC Interconnected System, 3 phase 4 wire star connected unbalanced load circuit. Cost comparison of distribution systems. 4.4 Impact of Power factor on voltage drop and Power factor Improvement methods. 4.5 Tariffs: Present tariff structures and incentives of various utilities like MSEDCL, Reliance and BEST.	10	12
Five	5.1 Types of faults: OC, SC, Earth Fault. 5.2 Protection of Alternator – Stator faults, Rotor Faults, External Faults, Earth fault protection, Merz- Price protection, and automatic field suppression. 5.3 Protection system for Transmission lines.- Distance relays, Open Circuit and earth fault relay. 5.4 LA, Isolators, Isolator with earth blade : constructional Details, operation and applications 5.4 PLCC – Need of PLCC, Different components of PLCC,	10	12
Six	6.1 Protection of Bus bars – Differential protection, Directional over current protection, Directional time and current graded scheme, Inverse time over current protection, 6.2 Protection of Feeders – Using Definite and Inverse time over current protection, Time graded and current graded system of protection	12	16

Students will able to

Intellectual Skill:

- Identify
- Discrimination

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

- Selection
- Interpretation
- Understanding
- Report Writing

Term Work:

The term work shall consist of the following assignments –
The drawing sheets of A1 size any three of the following.

1. Types of insulators.
2. Types of cables (cross sectional view) .
3. Layouts of substations, pole mounted substation –elevation.
4. Any two Layout of Protection scheme used for Protection of Alternator, Transmission Line, Power Transformer, Busbar and feeder

Professional Practice:

2. Students should visit to a Transmission / Distribution substation and prepare a visit report of it as a part of above Term Work.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	V. K. Mehta	Principles of Power System,	S. Chand and company, N. Delhi
2	B. R. Gupta	Generation of electrical energy	TMH Publication,
3	M.V.Deshpande	Electrical Energy generation and transmission,	TMH Publication
4	Soni,Gupta,Bhatnagar	A text book on power system engg.	D. Rai and company Delhi.
5	J.B. Gupta	A course in Electrical Power	TMH Publication.

B) Web Sites:

1. www.mahatransco.com
2. www.mahadiscom.com
3. www.youtube.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Electrical Estimation & Costing

Course code: R14EE4308

Course category : Applied

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	50	50	200

Rationale:

An Electrical Engineer has to go through various processes requiring estimation of materials & costing of the installation. In this course he will learn about the methods of estimation & earthing as per IS, which will be helpful to the quantity of materials & different methods of costing methods of earthing. He also will learn about methods of installations as per I S

Objectives:

The student should be able to

1. Know and use various wiring methods & terminology related with it as per I.S:732(1982).
2. Estimate & carry out costing of domestic & industrial installations.
3. Prepare a typical tender document.
4. Know about the estimation & costing of over head & U/G HT, LT lines.

UNIT	NAME OF THE TOPIC	Hours	Marks
1	Revision of wiring methods in various electrical installations with general requirements. Reading and Inspection of Electrical Engineering Drawings with plans and layouts. Standard practices of wiring & requirement of wiring as per relevant IS	08	12
2	General rules for wiring of residential: Installations and positioning of equipments, design of lighting and power circuits, Load calculation and drawing of single line diagram, Calculations of length of wire & quantity of wiring material for a residential installation. Selection of different wiring and safety accessories. Wiring diagram of individual switchboard. Preparation of bill of material. (Numericals)	08	12
3	Concept of commercial Installations, Differentiation between residential and commercial electrification, basic considerations for commercial electrical installations, Load Calculations , Design of Cable, and other accessories and fittings, Mounting arrangements and positioning of main switch, Distribution boards & switch boards.	12	16
4	Concept of Industrial electrification, Design consideration of electrical installation in small industry/factory/workshop, Machine wiring diagram and single line diagram, Important guide lines for installing Motor and its Power and control wiring. Motor current calculations, and accordingly selection of wire, cable size	12	16

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	and conduit. Selection of Fuse/MCB/MCCB, ELCB, Starter. Deciding the Cable route, length of wire, cable, conduit, Earth wire etc. Types of earthing as per I S & estimation of cost of earthing of installation, O.H. Lines & cables installation & their costing (Numerical) Requirement of Earthing installation for Distribution Substations, Residential and commercial installations.		
5	5.1 Meaning of terms used in estimation & costing. Principle of estimation Purpose of estimation & costing, approximate estimates. Detailed estimates. Preparation of detailed specification, standard specification book. Market rate for material & labor, standard schedules of rate	08	12
6	6.1. Principles of costing, methods of employing labor & making payments. Preparing rate analysis for items 6.2 Quotation, pricelists tenders clauses in tenders. Comparative statement, overhead charges, per point charging & fixed percentage costing, Administrative approval and technical sanctions, order of supply, payment of bills	08	12

Teaching Methodology: Chalk Board, PPT, Discussions

Term work:

Skills to be developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding

The term work shall consist of the following.

1. Three sheets of A1 size along with estimation report of the following
 - i. Domestic installation
 - ii. Industrial installation
 - iii. Cable installation or O.H. Line installation

2. Preparation of **COMPUTERIZED** tender notice or quotation for any electrical equipment or an electrical installation work.

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Professional Practice:

- 3 A guest lecture of eminent electrical contractor be arranged and the student should submit the lecture report as part of term work.
- 4 Student should collect the datasheets of various electrical components and accessories and use this data in their term work estimation

Learning Resources:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Arora bB.D.	Electrical Estimation & costing	S. Chand & Co
2	Dr. S. L. Uppal	Electrical Estimation & costing	Khanna Publications
3	Surjeet Singh	Electrical Estimation and Costing	Dhanpatrai Publications
4	K.B. Raina, S.K. Bhattacharya	Electrical esign; Esimation & costing	New Age International (P) Ltd. New Delhi
5	N. Alaggapan, E.Ekamberam	Electrical Estimation and costing	Tata MaGrawHill, New Delhi.

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME ELECTRICAL ENGINEERING

Course Name: Installation, Maintenance & Repair

Course code: R14 EE4309

Course Category: Applied

Credits : 06

Teaching & Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TT	PR	OR	TW	TOTAL
4	2	3	80	20	-	-	25	125

Rationale: An Electrical Engineering Diploma holder has to deal with various activities, such as installation of new electric systems, maintaining the existing systems such as rotary machines & repairing them. In this course the student will learn about causes of failure of electrical systems, maintenance types, and various types of installations & commissioning of the projects.

Objectives:

The student should be able to -

1. Imagine the location of the fault based on the behavior of the machine.
2. Know the usability of the instruments for fault finding
3. Describe the preventive maintenance for various machines
4. Know the BIS for the electrical insulation, insulation failure
5. Understand the process for the impregnation
6. Understand the importance of the safety in industry
7. Know the handling of the heavy equipments

	NAME OF THE TOPIC	Hours	Marks
1	1.1 Causes of failure of Electrical Equipment - Circuit faults, Electrical & Mechanical faults in Electrical Equipment like D C Machines, Transformer, and Induction motor. 1.2 Tools & instruments used for faultfinding.	11	16

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	1.3 Location of faults in Transformer, D.C. Machines, Induction motor, Synchronous motor, O.H. Lines, Batteries, C.B.		
2	2.1 Preventive Maintenance of Electrical Equipments like Transformer, D.C. Machines, Induction motor, O.H. Lines, Batteries, C.B. 2.2 Drying out & Varnish Impregnation processes. Condition Monitoring, Need of troubleshooting chart & maintenance.	08	12
3	3.1 Causes of insulation failure, Insulation testing as per I.S., Transformer oil failure, Dissolved gas analysis, Drying out & filtration of Transformer oil . 3.2 Installation of Transformer as per I S 3.3 Winding/rewinding of motor& transformers- Material & procedure	08	12
4	4.1 Electrical Safety - Statutory regulation (as per EA & IS). Permit to work system, Treatment for Electrical shock. Artificial respiration. Types & use of different fire extinguishers. 4.2 Installation of Induction motor & rotary machines.	11	16
5	5.1 Earthing -Revision of earthing methods. Permissible earth resistance for different types of installations. Methods of improving earth resistance. 5.2 Earth leakage circuit breaker - general construction & operation. Industrial overhead bus bar system. 5.3 Modern methods of installation of D.G. Sets	08	12
6	6.1 General Guideline for loading of Heavy equipments - Equipments & accessories used for loading & unloading of heavy equipment. Installation & commissioning of High & Low Tension overhead lines, cables, batteries, circuit breakers.	08	12

Teaching Methodology: Chalk Board, Power Point Presentations, Discussion

Term Work:

Skills to be developed

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i) Intellectual Skills

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding
- Reading
- Report Writing

ii) Motor Skills

- Proper Connection
- Testing
- Measurement
- Observe the result and Compare

The term work shall consist of the following assignments

1. Study of earth tester & measurement of earth resistance
2. Testing of Transformer oil or breakdown voltage testing of insulation material.
3. Overhauling of any electrical equipments.
4. Rewinding/winding of small transformer OR choke OR small motor
5. Location of fault in the following electrical equipments (any two)
 - a. Induction motor
 - b. D.C. Machines
 - c. Transformer

Learning Recourses:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	S.K. Bhattacharya	Installation, Maintenance & Troubleshooting of Electrical Equipments	TTTI, Chandigarh
2	C. Hebert	Preventive Maintenance of Electrical Equipments	McGraw Hill Co.
3	S.S. Rao	Testing ,Commissioning, Operation & Maintenance of Electrical Equipments	Dhanpat Rai Sons

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name : Project work and Seminar

Course Code: R14 EE 4310

Course Category : Applied

Credits : 04

Teaching Scheme & Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
-	4	-	-	--	-	50	100	150

Rationale: An Electrical Engineer while pursuing his career requires abilities like group working, leadership; work planning, acquiring information & presenting to the colleagues, preparing a neat project report etc. In this course the student get a chance to induct in him some of the above abilities.

Objectives: The student will be able to -

1. Develop the habit of group work, leadership & work co-ordination.
2. Develop the capability, confidence of doing a small project at individual level.
3. Develop the ability to acquire required data & presentation skills, acquire the confidence in communication.
4. Present the information in form of report.

Understand the importance of time management.

A) Term work:

Skills to be developed

i) **Intellectual Skills:** Identify

- Discrimination
- Selection
- Interpretation
- Understanding
- Reading
- Design Approach
- Report Writing

ii) **Motor Skills:** Proper connection

- Measurement
- Troubleshooting
- Testing
- Draw graph
- Observe the result and compare

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B) List of Practical/Experiment/Assignments:

The term work consists of three parts-Individual project, group project & seminar

1. Individual project-

A student has to fabricate a simple electric/electronic gadget. He should understand the functioning of various parts. Some of the gadgets suggested are as follows:

- i) Solid state lamp dimmer
- ii) M.W. Radio Receiver
- iii) Simple electronic controller for temperature, liquid level, light intensity measurement.

The assignments similar to given below may be considered as individual project

- i) Wiring installation of a small room
- ii) Rewinding of a small single phase motor/transformer

2. Group Project:

A group of 2 to 5 students should fabricate one electric / electronic equipment. Preference should be given to Industry sponsored projects. Some of the projects are as suggested.

1. Fabrication of control of control panel.
2. Rewinding of a 3-phase motor.
3. Digital clock
4. Lamp bank
5. UPS

3. Seminar:

A student has to study a topic generally relevant to electrical field, so that he can deliver a seminar for about 30 minutes. Some of the topics suggested as follows

- i. Elevators
- ii. Linear Induction Motor
- iii. Electric Power Generation from non-conventional energy source
- iv. Study of small-scale industry (from Entrepreneurship development aspect)

It is preferred that the students' visit an industry/organization to gather the information.

C) Field Work:

Visit the industry for deciding project, seminar topic

Learning Resources : Web sites for references: www.globalspec.com

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course : Energy Audit & Conservation

Course Code: R14EE5301

Course Category : Specialized

Credits : 06

Teaching & Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TT	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rationale: An Electrical Engineering Diploma holder has to deal with various aspects of energy related with consumption pattern, energy bill etc. The need of time is to search for energy conservation possibilities in various areas like industrial, commercial, agricultural & domestic sector. In this course the student learns about various energy aspects associated with energy conservation & procedure for energy audit.

Objectives:

The student should be able to

1. Know the importance of the non conventional energy sources, their operation, construction, advantages, disadvantages.
2. Understand the various sources of energy used in the industry for different purposes & importance of energy efficiency.
3. Know the importance of energy conservation in respect to various sectors & the methods of increasing it.
4. Understand the importance of energy audit in the energy conservation.

	NAME OF THE TOPIC	Hours	Marks
1	1.1 Sources of Energy: energy sources, stored & running sources. Non- conventional & conventional energy sources. Their advantages & disadvantages, necessity of conserving resources. Operation of Non-conventional energy sources 1.2 Energy & Environment Environmental concerns related to energy utilizations, the Green house effect, global warming & its effect, acid rain.	12	16
2	2.1 Energy in Non- Industrial sector: Use of energy in agricultural sector, commercial sector, domestic & public sector. Efficiency & energy conservation possibilities. Energy efficient motors.	10	12

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3	3.1 Energy in Industry: Energy sources for industry, comparison of energy sources. Various types of equipments used in industry for motive power, heating, lighting, welding, air conditioning etc. 3.2 Energy efficiency of these equipments. Possible improvement in energy uses	12	16
4	4.1 Energy Audit: Importance for energy conservation. Principle of energy audit. 4.2 Measurement & Measuring devices. Analysis of data, energy flow diagram, its use in ABC analysis.	10	12
5	5.1 Energy Conservation: Energy conservation using energy audit data in various sectors. Planning of energy conservation programme; equipments used for conservation. 5.2 Preparation of energy audit & conservation report. Payback period. Implementation & monitoring of the project of energy conservation.	10	12
6	6.1 Energy conservation in generation, transmission, & distribution. Demand side management. Energy conservation in air conditioning & refrigeration. Introduction to tariff system & application to reduce energy bill.	10	12

Teaching Methodology: Chalk Board, Discussion, Power Point Presentations

Term Work:

A] Skill To be Developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding
- Reading
- Report Writing

ii) Motor Skills:

- Proper Connection
- Measurement
- Observe the Result and Compare

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B] List of Practical:

A group of students (2 to 5) should prepare an energy conservation project report.

The project should include –

1. Data collection regarding existing location of load
2. Existing consumption of load & its pattern
3. Data analysis.
4. Suggestions regarding energy conservation
5. Calculation of payback period.

The group should visit a small-scale industry or a commercial establishment for this purpose.

Professional Practice:

1. Minimum Two lectures of the experts in the above field may be arranged. The student should write report of the lecture and submit as a part of term-work
2. Demonstration of energy saving using electric ballast and equipment based on non conventional energy sources is arranged like solar energy or Visit to wind farm be arranged.

Learning Recourse:

SR. NO	AUTHOR	TITLE	PUBLISHER
1	C. L. Wadhva	Energy Audit & Conservation	McGraw Hill Co.
2	P. Balasubramanian	Energy Auditing Made Simple	Bala Consultancy Services Chennai

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN : ELECTRICAL ENGINEERING

Course : Programmable Logic Controller

Course code:R14EE5302

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rational: Today's industry is automation industry. Most of the equipments are automated for better performance & higher productivity. It's using Programmable logic controllers for these purposes. An Electrical Diploma holder is supposed to work smoothly with PLC. This course will provide that sufficient knowledge to a student of electrical engineering about PLC.

Objectives:

The student will be able to

1. Know the elements of PLC
2. Understand the various basic concepts of PLC
3. understand the logic in building of the ladder network
4. Understand the module system of PLC
5. Know the use of processor as PLC

	NAME OF THE TOPIC	Hours	Marks
1	Programmable logic controller: Introduction to programmable logic controller, Block diagram of PLC-description , hardware ,types	08	12
2	Programmable logic controller- operation: concept of digital operation, concept of binary operation, binary data representation, input/output status files, 8 bit & 16 bit input signals Interfacing & memory system	08	12
3	Introduction to logic; conventional ladder versus Programmable logic controller ladder, operation of logic functions like AND, OR, NAND, NOR, EX-OR. Analysis of logic systems, Combination of logic elements for required systems.	11	16
4	Input/ output modules: specification of input modules & AC & DC Input modules. Input module operation, Interfacing of signals with input modules, Analog & digital inputs, Types of output modules like relay, transistor-transistor logic.	08	12
5	Programmable logic controller processors: The processor function,	08	12

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	operation system of processor, processor parts, serial communication between computer & programmable logic controller. Battery backup system, choosing correct processor for required operations.		
6	Programmable logic controller instructions: Instruction for relay operations, Instruction for timers , counter operations , Data handling instructions, Overview of instruction system for GE – FANUC/ROCKWELL/MISTUBISHI Programmable logic controller, Conversion of ladder diagram for machine controllers, Introduction to PLC instruction set.	11	16

Teaching Methodology: Chalk Board, Discussion, Power Point Presentation, Transparencies, Demo

A) Term Work:

Skills to be developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection
- Interpretation
- Understanding
- Reading
- Report Writing

ii) Motor Skills:

- Proper connection
- Measurement
- Testing
- Observe the result and compare

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C) List of Practical /Experiment/Assignment:

The term work shall consist all experiments from the following list.

1. Simulation of at least three different operations on programmable logic controller kit using temperature/ liquid level / flow transmitted signals
2. Preparation of simple ladder diagram for machine using contactor logic & converting it to Programmable logic controller system
3. Visit to industry applying Programmable logic controller for their operation & to prepare a visit list.

Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	Gary Dunning	Introduction To PLC	Thompson Publications
2	Richard Webb	PLC Control Systems	
3	A.K. Mukhopadhyay	Microprocessor, Microcomputers & their applications	Narosa Publications

B) Magazines

Electrical India (Chari Publication)

C) Web sites for references:

1. www.wikipedia.org

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name: Traction Systems
Course Category : Specialized

Course code : R14EE 5303
Credits : 06

Teaching & Examination Scheme

Teaching Scheme			Examination Scheme					
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rationale: It is expected that the Diploma Holder in Electrical Engineering has to deal with number of electrical equipments in the Traction system from the various aspects like operation, maintenance, testing etc. For this he should have the basic knowledge about the construction & operation of this equipment. In this course the students will learn about the various modes by which electrical energy is utilized in industries,

Objectives:

The student should be able to

1. To know about various drives used in the industry. & their characteristics & the factors to select drive for particular operation.
2. To be able to calculate the RMS value, & to design starter.
3. To know about system of traction in India, equipment used for them , their construction & operation
4. To be able to calculate the tractive force, energy consumption, torque, power & speed

	NAME OF THE TOPIC	Hours	Marks
1	Power Supply Arrangements: 1.1 – Introduction to Traction Supply System 1.2 – Constituents of Supply System -- Substations , Feeding Posts, Feeding and Sectioning Arrangements, Sectioning and Paralleling Post, Sub Sectioning and Paralleling Post, Sub Sectioning Post, Elementary Section. 1.3 – Miscellaneous Equipments at Control Post or Switching Stations. 1.4 – Major Equipments at Substation -- Transformer, Circuit Breaker, Interrupter. 1.5 – Protective System for AC Traction	10	12

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2	<p>Overhead and Current Collecting Equipments:</p> <p>2.1 – Overhead Equipments (OHE) -- Principles of Design of OHE, Composition of OHE, Height of Contact Wire , Contact Wire Gradient , Encumbrances , Span Length , Automatic Weight Tension and Temperature Compensation , Un-insulated and Insulated Overlaps, Neutral Section, Section Insulator and Isolator , Polygonal OHE-- Single Catenary Construction , Compound Catenary Construction , Stitched Catenary Construction - Modified Y Compound Catenary -- Effect of Speed on OHE , OHE Supporting Structure , Different types of signal boards of OHE</p> <p>2.2 Current Collecting Equipments -- Systems of Supplying Power in Electric Traction , Third Rail or Conductor Rail System , Overhead System, Current Collectors for Overhead System , Trolley Collector or Pole Collector , Bow Collector , Pantograph Collector, Types of Pantographs , Diamond Pantograph , Faiveley Type , Methods of Raising and Lowering of Pantograph</p>	12	16
3	<p>Signalling and Train Lighting :</p> <p>3.1 – Signalling -- Requirements of Signalling System , Types of Signals , Colour Light Signals ,Three and Four Aspects of Colour Light Signals. Track Circuits-- DC Track Circuit , AC Track Circuit</p> <p>3.2 Supervisory Control-- Advantages of Remote Control , Systems of Remote Control , DC versus Variable Frequency (VF) Signaling, Remote Control System Equipment and Network , Mimic Diagram , Control Desk for TPC</p> <p>3.3 Train Lighting-- Systems of Train Lighting , Special Requirements of Train Lighting , Method of obtaining Unidirectional Polarity , Method of obtaining Constant Output , Single Battery System, Double Battery Parallel Block System, Failure of under frame Generating Equipments, End on Generation.</p>	10	12
4	<p>Electric Locomotives:</p> <p>4.1 – Classification of Locomotives and EMU .</p> <p>4.2 Power Circuit-- Power Circuit Diagram of AC Locomotive ,Equipments in Power Circuit and their Functions , Circuit breaker and Earthing Switch , Tap Changer , Traction Transformer , Rectifier: Rectifier Connections , Smoothing Reactor , Equipments in Auxiliary Circuit & their Functions , Head Light , Flasher Light , Horn , Marker Light , Batteries , Arno converter, Blowers , Exhausters, Compressors , Selsyn transformer.</p> <p>List and Function of Different Type of Relays , List and Purpose of Different Type of Contactors ,</p> <p>Three Phase Locomotive , Power Circuit of Three Phase Locomotive, Power Supply Arrangement for Auxilliary - Machines in Three Phase Locomotive</p>	10	12

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5	<p>Protection and Maintenance of Electric Locomotive: 5.1 – Protection of Electric Locomotive -- Broad Strategy For Protection , Surge Protection , Direct Lightning Strokes , Switching Surges: External and Internal , Overload Protection of Main Power Circuit , Earth Fault Protection of Power and Auxiliary Circuit , Protection from Over Voltage and Under Voltage Differential Current Protection of Traction Circuits -- Protection against High and Low Air Pressure in the Air Circuit , Temperature Monitoring 5.2 Maintenance of Locomotive -- Need of Maintenance and Policy of Obsolescence , Defects , Ideal Maintenance, Means to Improve the Reliability of Locomotive , Means to Improve Availability of Locomotive , Means to Reduce Maintenance Cost , Maintenance Record, Characteristics of Efficient Maintenance , Electrical Faults and Their Causes.</p>	12	16
6	<p>Modern Trends in Traction: 6.1 LEM Propelled Traction – Linear Electric motor, Linear induction based traction systems, - Moving Primary Fixed Secondary Single Sided LIM , Moving Secondary Fixed Primary Single Sided LIM , Moving Primary Fixed Secondary Double Sided LIM . Strengths/Weaknesses of LIM Propelled Railway Traction -- Strengths of LIM Propelled Railway Traction System , Weaknesses of LIM Propelled Railway Traction System , Practical Possibilities of LIM Propelled Transportation</p>	10	12

Teaching Methodology: Chalk Board, PPT.

Professional Practices:

Visit to loco shed / industry manufacturing heating / welding unit. Literature survey. **s:**

Five Drawing Sheets (full Imperial Size) and Report on each Sheet

- (1) Traction Substation and Feeding Post Layout
- (2) Overhead Equipments (OHE) and Current Collecting Equipments (at least 6 equipments on 2 sheets)
- (3) Signaling and Train Lighting,
- (4) Power Circuit in Electric Locomotive and Auxiliary Circuit Equipments

Books:

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SR. NO.	AUTHOR	TITLE
1	Taylor E. O	Utilization of Electrical Energy
2	Partab H	Art & Science of Utilization of Electrical Energy
3	Soni, Gupta & Bhatnagar	A Course in Electrical Power
4	Uppal S. L	Electrical Power
5	Partab H	Modern Electrical Traction
6	Sayyed B. C.	Utilization of Electrical Energy
7	J. Upadhyay ,S. N. Mahendra	Electric Traction
8	Om Prakash Kesari	Viddut Engine Parichay (In Hindi)
9	J. B. Gupta	Utilisation of Electric Energy (Including Electric Traction)
10	Gopal Dubey	Traction Drives
11	B.N. Sarkar	Traction System

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DIPLOMA PROGRAMME : ELECTRICAL ENGINEERING

Course Name: Illumination

Course code: R14EE 5304

Course Category : Specialized

Credits : 06

Teaching & Examination Scheme

Teaching Scheme		Examination Scheme						
TH	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rationale: It is expected that the Diploma Holder in Electrical Engineering has to deal with number of electrical equipments in the Industry from the various aspects like design and , testing etc. For this he should have the basic knowledge about the construction & operation of various illumination equipment. In this course the students will learn about the various modes by which electrical energy is utilized in industries for, illumination .

Objectives:

The student should be able to ,

5. To know about various wiring methods & terminology related with Illumination as per I.S
6. To understand the procedure for designing, estimation & costing of domestic & industrial illuminaries
7. To survey and prepare comparative study of various types of illuminaries and supporting accessories..

	NAME OF THE TOPIC	Hours	Marks
1	1. Fundamentals of Illumination : Fundamentals of Illumination , Illumination terminology: Illumination, Light intensity, Lumen, Lux, Luminaries, Luminous Efficiency ,Laws of Illumination (Simple numerical) , Features of good Illumination scheme, Lux meter Standard Illumination level required for various locations. Advantages of good Illumination scheme.	08	12
2	2. Lamps & Lighting Accessories : Types of Lights-- a. Visible light , b. Ultraviolet light , c. Infrared light Types of lamps: a. Incandescent lamp, b. ARC lamps – ac &dc arc lamp c. Fluorescent lamp ,d. Mercury vapour lamp , HPMV lamp, Mercury iodide lamp ,Xenon lamps. Sodium vapour lamp ,f. Neon lamp , Neon	08	12

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	<p>Sign Tubes g. Halogen lamp ,h. CFL Lamps ,i. Metal halides lamp ,j. LED lamps k. Special purpose lamps Construction , working principle advantages and disadvantages of all lamps Comparison between incandescent & Florescent lamps Lighting schemes: selection of lamp, illumination efficiency , glare & power consumption , a. Direct & Indirect ,b. Semi direct & semi indirect c. General lighting scheme Lighting calculation methods :a. Watt /m² method, b. Lumens or light flux method ,c. Point to point method (Simple numerical)</p>		
3	<p>Illumination Control and Control circuits: Purpose of lighting control , Working principle and operation of : Dimmer - a. Resistance type dimmer b. Salt water dimmer , Dimmer Transformer - 1) Auto transformer dimmer 2) Two winding transformer dimmer , Electronic Dimmer : working principle and operation , a. Thyristor operated dimmer ,b. Triac operated dimmer , Control of Enhance Lighting , Methods used for light control. Control circuits for lamps : single lamp controlled by single switch, two switches, Single Lamp control by two point method , three point method & four point method , Polar curve : its meaning and applications for designing the lamps .</p>	10	16
4	<p>Illumination for Interior Applications: Standards for various situations in Interior Illumination, Methods for Designing illumination schemes , Design considerations for Interior location of Residential ,Commercial, Industrial premises . Design Illumination scheme for different Interior locations of Residential, Commercial, Industrial unit. (Numerical on above sub topics)</p>	08	12
5	<p>Illumination for Outdoor Applications: General requirements for lighting schemes , Specific requirements for above schemes, Factory Lighting , Street Lighting , Flood Lighting , Railway platform Lighting , Lighting for Advertisement/Hoardings , Sports Stadium Lighting , Simple numerical based on design of simple schemes .</p>	10	16
6	<p>Lighting for special applications: Lighting schemes and general requirements for : Agricultural & Horticultural applications , Health Care Centers and Hospitals , decorative lighting , stage lighting, Aquariums & Shipyards.</p>	08	12

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Teaching Methodology: Chalk Board, PPT.

Professional Practices:

Visit to loco shed / industry manufacturing heating / welding unit. Literature survey.

List of Practical:

1. To measure illumination by Lux meter of given installation.
2. Prepare a report on Market survey for various lighting accessories.
3. Study the different lighting accessories and lamps & their working
4. Design of Illumination scheme for Residential Installation.
5. Design Illumination scheme for Commercial Installation.
6. Design Illumination scheme for Industrial Installation.
7. Design Illumination scheme for Flood Lighting.
8. Preparation of the comparative statement for given Location for different companies lighting accessories by surveying and data collections from at least four companies..

Learning Resources:

Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1	N.V.Suryanarayana	Utilisation of Electrical Power	Wiley Eastern Limited
2	Jack I. Lindsey	Applied illumination engineering	The Fairmont Press Inc.
3	R.H. Simons& Robart Bean	Lighting Engineering & applied calculations	Architectural Press (ISBN0750650516)

CUSROW WADIA INSTITUTE OF TECHNOLOGY, PUNE -1.

DIPLOMA PROGRAMME IN ELECTRICAL ENGINEERING

Course :Microprocessor and Microcontrollers

Course Code:R14EE5305

Course Category : Specialized

Credits : 06

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
4	2	3	80	20	-	25	25	150

Rational: Today microprocessors and microcontrollers have become an integral part of all automatic and semi automatic machines. Therefore there is a growing need of engineers / technicians in this field. Hence, it is necessary to study microcontroller basics, hardware and its programming.

This subject covers microprocessor 8085 and microcontroller 8051 architecture, its instruction set , programming and applications. After completing this subject the student can write and execute programs for microcontrollers and microprocessors based applications.

Objectives:

The student will be able to

6. Describe architecture and operation of microprocessor 8085.
7. Develop assembly language programs using instruction set of 8085.
8. Describe architecture and operation of microcontroller 8051.
9. Develop assembly language program using instruction set of 8051.
10. Design and develop microcontroller based systems.
11. Explain various applications of microcontrollers.

	NAME OF THE TOPIC	Hours	Marks
1	Microprocessor 8085 1.1 Evolution of microprocessor 1.2 Architecture of 8085 1.3 Pin diagram 1.4 Control signals 1.5 Multiplexing of address & Data bus	10	12
2	8085 Assembly Language Programming 2.1 Programming Model of 8085 2.2 Addressing Modes 2.3 Instruction classification , Instruction format 2.4 Instruction set 2.5 Stacks and subroutine 2.6 Assembly Language programming	08	12

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3	<p>Microcontroller Basics</p> <p>3.1 Introduction and applications 3.2 Comparison between microcontrollers and microprocessors 3.3 Evolution of microcontrollers 3.4 Commercial microcontroller devices</p> <p>8051 Architecture</p> <p>4.1 Block diagram of 8051 Microcontroller 4.2 Registers in 8051 4.3 General purpose or working registers 4.4 Stack pointer and Program counter 4.5 Special function registers (SFR) 4.6 Program Status word 4.7 Data pointer(DPTR) 4.8 Timer registers 4.9 Ports 4.10 Control registers</p>	12	16
4	<p>8051 connections, I/O ports and memory organization</p> <p>5.1 8051 pin connection 5.2 8051 connections 5.3 Parallel I/O ports 5.4 Memory organization</p> <p>8051 addressing modes and instructions</p> <p>6.1 8051 addressing modes 6.2 8051 instruction set 6.3 8051 assembler and assembling 8051 program 6.4 Software simulators of 8051 6.5 8051 instruction and simple programs</p>	12	16
5	<p>8051 interrupts, timer/ counters and serial communication</p>	10	10

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	7.1 Interrupts in 8051 7.2 Initializing 8051 interrupts 7.3 Interrupt priorities 7.4 Timers and counters, timer counter modes 7.5 Serial communication, serial communication modes		
6	Application of microcontrollers 8.1 Square wave and rectangular wave generation 8.2 Pulse generation 8.3 Pulse width modulation 8.4 Frequency counter 8.5 Interfacing small keyboards 8.6 Interfacing LCD display, 8.7 Interfacing D/A and A/D converters 8.8 Interfacing relay 8.9 Interfacing stepper motor 8.10 Interfacing DC motor	10	12

Teaching Methodology: Chalk Board, Discussion, Power Point Presentation, Transparencies, Demo

A) Term Work:

Skills to be developed:

i) Intellectual Skills:

- Identify
- Discrimination
- Selection

- Interpretation
- Understanding
- Reading
- Report Writing

ii) Motor Skills:

- Proper connection
- Measurement

- Testing
- Observe the result and compare

**C) List of Practical/ Experiment/
Assignment:**

Using microprocessor 8085 kit:

1. Demonstration and study of microprocessor kit.
2. Program for addition of and subtraction of two hexadecimal numbers
3. Program for finding largest / smallest number
4. Program for arranging numbers in ascending / descending order
5. Program for 16 bit addition
6. Program for data masking
7. Program for multiplication of two eight bit numbers
8. Program for using JMP Instruction
9. Two programs using loop & Counter

Using Microcontroller kit

1. Demonstration and study of microcontroller kit
2. Demonstration and use of software simulator / assembler
3. Programming example (any two)
– Data transfer instructions
4. Programming example (any two)
– Logical Operation
5. Programming example (any two)
– Jump and Call Instructions
6. Demonstration and testing of the following applications(any four)
 - Keyboard Interface
 - LCD display Interface
 - D/A or A/D converter Interface
 - Stepper motor control
 - DC motor control
 - Any other practical application using microcontroller 8051

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Learning Resources:

A) Books:

SR. NO.	AUTHOR	TITLE	PUBLISHER
1.	Ajay V Deshmukh	Microcontroller theory and applications	TMH, New Delhi
2.	Kenneth J Ayala	8051 microcontrollers architecture , Programming and Applications	International Thompson publishing. India
3.	B. Ram	Microprocessor, Microcomputers	S. Chand Publications
4.	Ramesh Goankar	Microprocessor Architecture, Programming ,and Application with the 8085	Penram International Publishing (India) Pvt. Ltd.