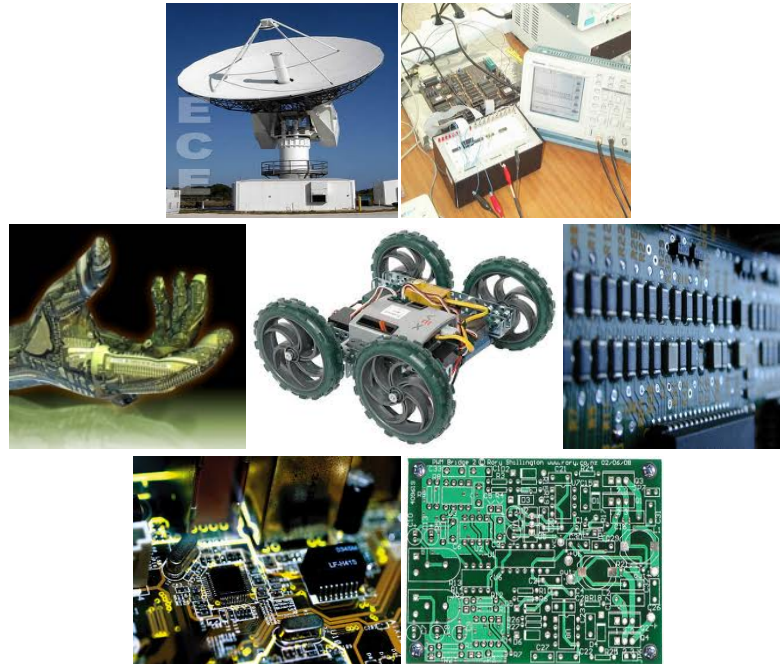


Government Polytechnic, Aurangabad

(An Autonomous institute of government of Maharashtra)



*Fifth revision curriculum document
2012-2013*

Department of Electronics & Telecommunication

VISION

Government Polytechnic, Aurangabad will be world class technical institute pursuing for excellence, catering to the needs of global community, striving for its harmonious development by inculcating lifelong learning skills to serve for the socio economic development having concerned for ecology and social harmony

MISSION

To create multi disciplinary best citizens to suit local, state, National and International needs having scientific temperament , moral ethics , values and multi faceted proactive personality by providing excellent education system

CERTIFICATE

This is to certify that the Curriculum of Diploma in Electronics and Telecommunication Engineering Programme has revised to be implemented from academic year 2012-13.

The curriculum is hereby approved by program board of studies

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Date:

CERTIFICATE

This is to certify that the Curriculum for Diploma in Electronics and Telecommunication Engineering Program of Government Polytechnic, Aurangabad (An Autonomous Institute of Govt. of Maharashtra) which has been implemented with effect from academic year 2012-13, is equivalent to Diploma in Electronics and Telecommunication Engineering Program Implemented by Maharashtra State Board of Technical Education,

Equivalence for above mentioned course is hereby granted.

Member

Member

Member

Member

Member

Member

Member Secretary

Chairman

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SCOPE OF DIPLOMA IN ELECTRONICS & TELECOMMUNICATION

Electronics & Telecommunication Engineering a very recent branch in engineering has dominated all the aspects of the human life in the span of very less time. In recent years Electronics & Telecommunication field has made a remarkable & unprecedented growth in terms of new technologies and its applications in our day to day life, it has fulfilled the needs of industries, society in terms of product development as well as creating warranted facilities to the society. These days our life is all dominated with number of Electronics equipments or gadgets, which we use in our day to day life. In this age which is par scientific revolution, Computers, iPods , Laptops, Mobile Phone, different advanced Communication equipments and other gadgets like Television, DVD player etc are our basic requirements. It has been effectively used in Industrial Automation, Automotive Electronics, Avionics, Security Systems, Defence etc. The advancements in these areas have enriched our life in a great way. To cope with currently changing technological environment, it is mandatory to learn right from basics to diversified areas of electronics. Highly skilled and scientifically oriented manpower, students, faculty & industrial staff need proper training in the recent technologies to improve productivity of organization.

This Diploma in Electronics & Telecommunication will contribute in developing competent technicians who will perform their jobs in Industry or as an entrepreneur effectively and efficiently. In Industry or in small business establishments, the technicians (Diploma holder) with necessary skills would be able to plan, erect, commission, use and maintain the equipments and also supervise tasks. This program will develop competencies required to construct, troubleshoot, repair & maintain various Electronic equipments and appliances.

This program apart from developing the above mentioned professional skills would also develop some of the soft skills like communication skills and Generic skills. Diploma holder of Electronics and Telecommunication is generally employed in Electronics firms & allied industries. The critical core attitudes & skills are Personality development, Social development, Life long learning attitude, Core skills in the design and testing and Core skills in production stages.

Areas of Employment/ work

Sr. No.	Type of Industries / Organization	Designation
01	Entrepreneur	Owner of Small Scale Industry
02	Catering services to society (Networking)	Telecommunication Engineer
03	Electronics Goods Manufacturing industry	Supervisors (Middle level) / Marketing Executive
04	Job in Industry / Public sector	Design Assistant / Customer Service Engineer
05	Repairing & maintenance of Electronic equipments and appliances	Maintenance Engineer

Identified Job Functions _

Sr. No.	Designation	Job Functions
01	Entrepreneur	*Project Management *Estimate, Procure & install necessary machinery. *Monitoring of all activities *Administer & Manage an industry *Marketing. *Keep control over production quality.
02	Supervisor	* Knowledge about activity of industry. * Co-ordination of staff. * Implementation of Production Planning and control in Co-ordination with other dept. * Plan, monitor and effectively Implement activities as per Policy. * Safety of men & machines. * Quality Policy. * Get the job done from workers. * Follow daily schedule. * Keep a watch on quality
03	Telecom Engineer	Installation, Commissioning of Network Organization of network services
04	Design Assistant	Preparation of artwork and PCB, Soldering, testing of prototype
05	Maintenance Engineer	After sales support, Repairing of various equipments, fault finding and troubleshooting

Program Aims

- To provide a practice oriented education, emphasizing execution of design plan and in-depth knowledge of the competencies required for the profession.
- To develop competencies mentioned in the Curriculum.
- To develop practical approach of student in technical subjects and provide hands on experience as much as possible.
- To develop professional skills as well as personality traits of the student along with Technical knowledge

Identified Competencies required

- To be aware of basic of Measurements of electronic parameters & Measuring Instruments.
- To know, construct, design and test the analog circuits
- To know, construct, design and test the digital circuits
- To develop software skills so as to develop logical approach in design and development of electronic /telecom systems
- To handle laboratory equipments
- To develop fault finding ability
- To develop demonstrational methodology & presentation skills
- To understand microprocessors/microcontrollers and to develop applications using them.
- To design PCB and construct prototype of small projects
- To understand elements and techniques of communication systems
- To understand the principles and concepts of management
- To understand various features of computer network and network operating systems.
- To be aware of latest developments in Electronic/Telecom Industry.
- To be aware of effect of electronic/telecom Industry on environment.

Curriculum Design and Development process:

APPROACH TO DESIGN OF CURRICULUM

This Curriculum has been designed on the systematic approach based on competency-based curriculum of educational technology and theories of learning. The data is collected in following ways

- Feedback of alumni
- Feedback of staff
- Past experience of 3 years.
- Through observational records
- By study of documents used in industries, expert reports, newspapers and trade literatures etc., their views on different aspects of the curriculum.
- Through a series of discussions in program committee.

Taking into account the knowledge, skills/competencies, attitudes etc. required to be possessed by the diploma pass outs the content of different courses is designed.

While designing the curriculum emphasis is given on following points.

- New/emerging technologies being used in the world of work.
- Personal values and social skills required to be possessed.
- Skills related to life-long learning and independent study.
- Professional skills required for different jobs along a career path.

Strategy adopted for Curriculum development -

Dept.coordinator

HOD

Incharge CDC

INTRODUCTION

Curriculum development is a dynamic process, which is governed by the contemporary needs of the user-system. All the activities in any academic institution are guided by the curricula operating in the institution. Design of curricula and their implementation therefore requires utmost attention of one and all for its effectiveness.

It was felt that design, review/revision should be based on scientific principles of educational technology and theories of learning and it must reflect the needs, expectations and aspirations of stakeholders/ clients in the technician education system. These needs of user system mainly fall in the following four domains namely

- Personal development domain
- Social development domain
- Continued learning skills domain
- ‘Earning to live’ or ‘Professional Skills’ development domain

Curriculum is designed on competency based. All competencies needed for Electronics & Telecommunication diploma holder is first listed. Based on this structure of curriculum is prepared. Attempts have been made in this document to address to the expectations of the user system from the Diploma pass outs. If implemented in right spirit, it would pay much better dividends, it is hoped

Salient Features of curriculum -

- Modified Competency based curriculum
- Development of Soft and Generic skills among the students by incorporation of courses like seminar, Communication Skills, Professional Practices and non examination courses.
- Introduction to few interdisciplinary courses
- Development of management skills.
- Inclusion of few new courses to meet the needs of global technology trends such as Electronics Circuit Design, introduction to Embedded System, Mobile Communication .
- Addition of practical oriented courses
- Multi Point Entry

Describing roles/ functions of a technician-

A technician, say for example in a medium size engineering enterprise, working at middle level management position may have to carry out jobs in different departments. These are identified as

- Installation, inspection, production & control
- Repair & maintenance
- Marketing and sales
- Purchase & Store
- Observation at Site
- Analysis, Design and Costing.
- Research & development

Designing content of each curriculum area

- Different courses are categorized as
 - Foundation Level
 - Basic Level
 - Allied Level
 - Applied Level
 - Diversified Level
- Curriculum scheme of each course along with course code is given at the beginning
- Competencies to be developed are identified and written.
- Rationale of each course is highlighted.
- Objectives of each course are highlighted and written.
- Content outline in descriptive form was derived. Generally the content outline of a subject was divided into chapters and then from chapters into topic outline.
- Having derived the total content outlines i.e. Theory. At the end of the theory content list of practical is added for each course, following were arrived at by consensus-
 - Time required by a teacher to teach the prescribed theory and practical parts
 - Number of courses per term to be taken.
 - Total no. of hours required to teach the entire course.
 - Total no. of lectures and practicals per week.
- Approach to the assessment of student's learning and types of assessment techniques to be used were decided. An assessment scheme was designed, which is a suitable

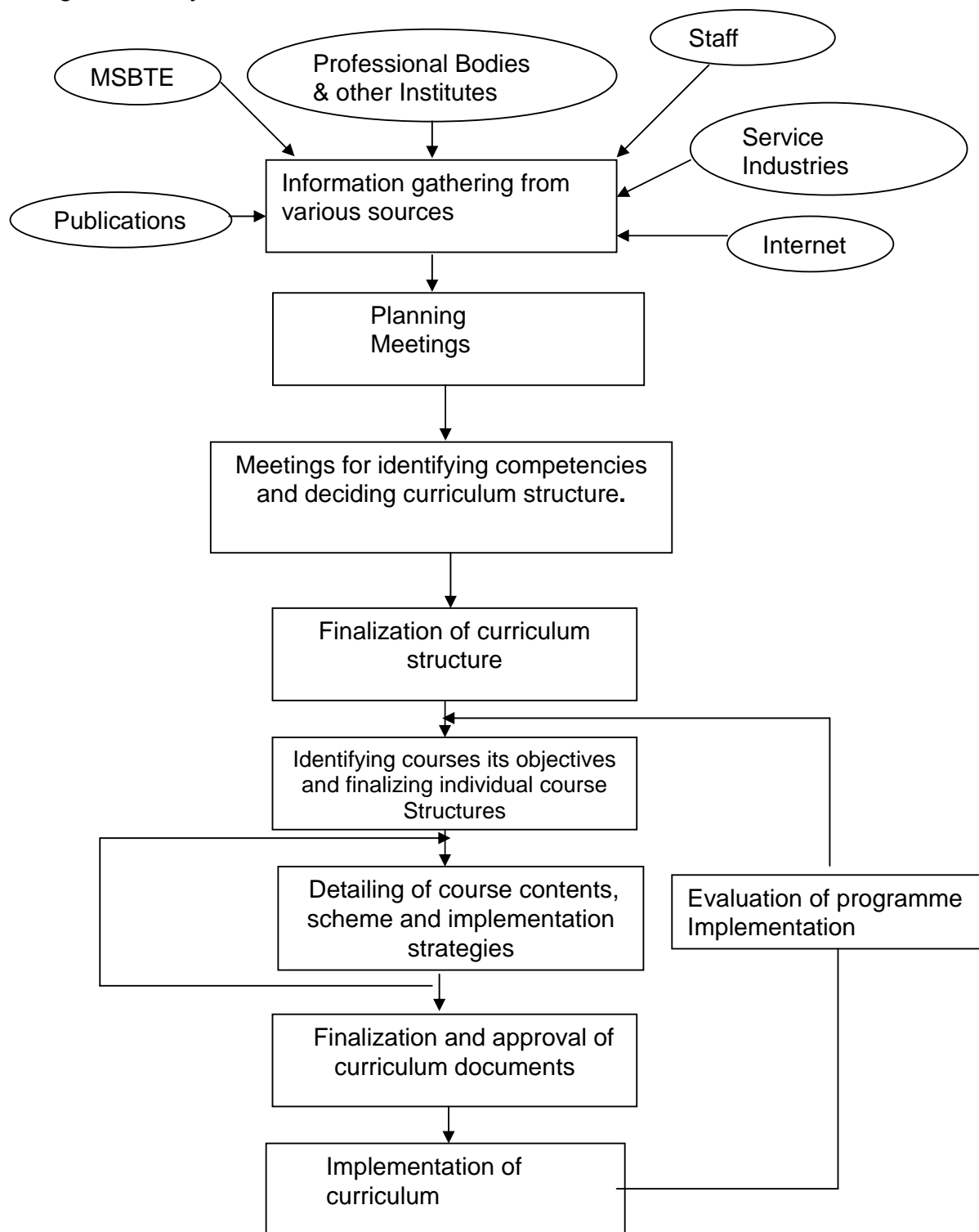
mix of (a) continuous evaluation of term-work (b) progressive test (c) Term end examination.

- Implementation strategies for each subject were identified.
- Learning resources for students were prescribed such as
 - Teacher's lecture notes
 - Basic text-book covering most of the topics in the curriculum and other books
 - Monographs, handbooks, periodicals, articles, journals etc.
 - Data-books, manuals, standards etc

In all these activities, views of senior teachers regarding relevance of course contents and implementation strategies being presently followed are sought.

DEVELOPING/ FINALISING A PROGRAMME STRUCTURE

Programme structure consisting of teaching and examination schemes was finally arrived at through consensus. The approach followed for curriculum development is shown diagrammatically as follows:-



Fifth Curriculum Revision

Program structure

Sr. No.	Level	No of Credits	No. of courses		Total exam heads		Total marks	
			Compulsory	Optional	Theory	Non Theory	Theory	Non Theory
01	Foundation	28	07	NIL	04	03	400	350
02	Basic	37	08	NIL	05	03	500	450
03	Allied	27	08	NIL	03	04	300	300
04	Applied	67	14	02	10	04	1000	900
05	Diversified	25	05	02	05	NIL	500	250
Total		184	42	04	27	15	2700	2250

Scheme at a glance

Total courses offered	: 46
Compulsory courses	: 42
Optional courses	: 04
Total courses	: 46
Total credits	: 184
Total marks	: 4950

LEVEL WISE COURSE STRUCTURE

Program: Diploma in Electronics & Telecommunication

Level: 1 Foundation Level Courses

Sr. No.	Course Code	Course Name	Sub Abbr	Teaching Scheme				Examination Scheme					Total
				TH	Pr	Cr	Term	PT	TH	Pr	TW	Or	
01	5G101	Basic Mathematics	BMT	04	--	04	I	20	80	--	--	--	100
02	5G102	Engineering Mathematics	EMT	04	--	04	II	20	80	--	--	--	100
03	5G103	Engineering Physics	EPH	03	02	05	I	20	80	25	25	---	150
04	5G104	Engineering Chemistry	ECH	03	02	05	II	20	80	25	25	---	150
05	5G105	Work Shop Practice	WSP	00	03	03	II	--	--	---	50		50
06	5G106	Engineering Graphics	EGP	02	02	04	I	--	--	50	50		100
07	5G107	Basics of Computer System	BCS	01	02	03	I	--	--	50	50		100
Total				17	11	28		400		350			750

Scheme at Glance

Total number of courses offered	: 07
Number of Compulsory Courses	: 07
Number of Optional Courses	: Nil
Total Courses	: 07
Total Credits	: 28
Total Marks	: 750

Program: Diploma in Electronics & Telecommunication

Level: 2 Basic Level Courses

Sr. No	Course Code	Course Name	Sub Abbr	Teaching Scheme				Examination Scheme					
				TH	PR	CR	Term	PT	TH	PR	TW	Or	Total
01	5X201	Components & Testing	C&T	00	04	04	I	--	--	--	25	25	50
02	5X202	Electronic Measurement & Instruments	EMI	03	02	05	III	20	80	25	25	--	150
03	5X203	Electrical Technology	ETG	04	02	06	I	20	80	--	25	25	150
04	5X204	Electronic Devices and Circuits I	EDC I	04	02	06	II	20	80	25	25	---	150
05	5X205	Digital Electronics	DET	03	02	05	II	20	80	25	25	---	150
06	5X206	Circuits and Networks	CNW	03	02	05	III	20	80	--	25	25	150
07	5X207	Electronics Workshop	EWS	00	04	04	IV	--	--	--	50	50	100
08	5X208	Professional Practices	PPR	00	02	02	IV	---	---	---	50	--	50
Total				17	20	37		500			450		950

Scheme at Glance

Total number of courses offered	: 08
Number of Compulsory Courses	: 08
Number of Optional Courses	: Nil
Total Courses	: 08
Total Credits	: 37
Total Marks	: 950

Program: Diploma in Electronics & Telecommunication

Level: 3 Allied Level Courses

Sr. No.	Course Code	Course Name	Sub Abbr	Teaching Scheme				Examination Scheme					
				TH	Pr	Cr	Term	PT	TH	Pr	TW	Or	Total
01	5G301	English	ENG	02	02	04	I	20	80	---	25	---	125
02	5G302	Communication Skills	CMS	01	02	03	II	--	--	---	50	25	75
03	5G303	Entrepreneurship Development	END	01	02	03	V	--	--		25	25	50
04	5X301	C Programming	CPR	02	04	06	III	20	80	25	25	--	150
05	5G304	Environmental Sciences	ENS	02	00	02	III	--	---	---	50	--	50
06	5G305	Industrial Management	INM	03	02	05	IV	20	80		25	25	150
07	5G311	Non- Exam		00	02	02	II						
08	to 5G320	Non-Exam		00	02	02	III						
Total				11	16	27		300			300		600

Scheme at Glance

Total number of courses offered	: 08
Number of Compulsory Courses	: 08
Number of Optional Courses	: Nil
Total Courses	: 08
Total Credits	: 27
Total Marks	: 600

Program: Diploma in Electronics & Telecommunication

Level: 4 Applied Level Courses

Sr. No.	Course Code	Course Name	Sub Abbr	Teaching Scheme				Examination Scheme					
				TH	Pr	Cr	Term	PT	TH	Pr	TW	Or	Total
01	5X401	Signals & Systems	S&S	03	02	05	III	20	80	--	25	25	150
02	5X402	Linear Integrated Circuits	LIC	03	02	05	IV	20	80	25	25	--	150
03	5X403	Principles of communication Engg.	PCE	04	02	06	III	20	80	25	25	--	150
04	5X404	Microprocessors	MPU	04	02	06	IV	20	80	25	25	--	150
05	5X405	Electronic Devices & Circuits II	EDCII	04	02	06	III	20	80	25	25	--	150
06	5X406	Power Electronics	PET	03	02	05	V	20	80	---	25	25	150
07	5X407	Digital Communication	DCM	03	02	05	V	20	80	--	25	25	150
08	5X408	Telecommunication Switching systems	TSS	03	02	05	IV	20	80		25	25	150
09	5X414	Microwave & Satellite Communication	MSC	03	02	05	V	20	80		25	25	150
10	5X410	Computer Hardware & Networking	CHN	02	04	06	VI	--	--	--	50	50	100
11	5X411	Seminar	SEM	00	02	02	V	--	--	--	50	50	100
12	5X412	Project	PRO	00	04	04	VI	--	--	--	100	50	150
13	5X413	Visual Basic	VB	00	02	02	IV	--	--	--	25	25	50
14	Any one from Group A												
a)	5X415	Digital Circuits & Systems	DCS	03	02	05	V	20	80		25	25	150
b)	5X416	Control System	COS	03	02	05	V	20	80		25	25	150
c)	5X417	Biomedical Instrumentation	BIS	03	02	05	V	20	80		25	25	150
Total				35	32	67		1000		900		1900	

Scheme at Glance

Total number of courses offered	: 16
Number of Compulsory Courses	: 13
Number of Optional Courses	: 01
Total Courses	: 14
Total Credits	: 67
Total Marks	: 1900

Program: Diploma in Electronics & Telecommunication

Level: 5 Diversified Level Courses

Sr. No	Course Code	Course Name	Sub Abbr	Teaching Scheme				Examination Scheme					Total
				TH	Pr	Cr	Term	PT	TH	Pr	TW	Or	
01	5X501	Mobile & Fiber optic communications	MFO	03	02	05	VI	20	80	-	25	25	150
02	5X502	Electronic Circuit Design	ECD	03	02	05	VI	20	80	-	25	25	150
03	5X503	Audio Video Engineering	AVE	03	02	05	V	20	80	-	25	25	150
04	5X504	Microcontrollers	MIC	03	02	05	V	20	80	--	25	25	150
05	Any one from Group B												
a)	5X505	Microcontroller based Systems	MBS	03	02	05	VI	20	80	-	25	25	150
b)	5X506	Digital Signal Processing	DSP	03	02	05	VI	20	80	-	25	25	150
c)	5X507	Industrial Automation	IAU	03	02	05	VI	20	80	-	25	25	150
Total				15	10	25		500		250		750	

Scheme at Glance

Total number of courses offered : 07
 Number of Compulsory Courses : 04
 Number of Optional Courses : 01
 Total Courses : 05
 Total Credits : 25

Total Marks : 750

5th Revision Sample Path (184 credits)

Year I		Year II		Year III	
Odd	Even	Odd	Even	Odd	Even
(5G101)Basic Mathematics (4+0)	(5G102) Engineering Mathematics (4+0)	(5X206) Circuits and Networks (3+2)	(5G305) Industrial Management (3+2)	(5G303) Ent.Dev. (1+2)	(5X410) Computer Hardware & Maintenance (2+4)
(5G103) Engineering Physics (3+2)	(5G104) Engineering Chemistry (3+2)	(5X301) C Programming (2+4)	(5X207) Electronics Workshop (0+4)	(5X411) Seminar (0+2)	(5X412) Project (0+4)
(5G301)English (2+2)	(5X204) Electronic Devices and Circuits I (4+2)	(5X403) Principles of Communication Engg. (4+2)	(5X401) Signals & Systems (3+2)	(5X414) Microwave & Sat. Com. (3+2)	(5X501) Mobile & Fiber Opt.Comm (3+2)
(5G106) Engineering Graphics (2+2)	(5G302) Communication Skills (1+2)	(5X405) Electronic Devices & Circuits II (4+2)	(5X402) Linear Integrated Circuits (3+2)	(5X504) Microcontrollers (3+2)	(5X502) Electronic Circuit design (3+2)
(5G107)Basics of Computer System (1+2)	(5X205) Digital Electronics (3+2)	(5X202) Electronic Measurement & Instruments (3+2)	(5X408) Telecommunication Switching. systems (3+2)	(5X406) Power Electronics (3+2)	(5X503) Audio video Engineering (3+2)
(5X201) Components & Testing (0+4)	(5G105) Workshop Practice (0+3)	(5G304) Environmental Science (2+0)	(5X404) Microprocessors (4+2)	(5X407) Digital communication (3+2)	(5X505) Microcontroller based Systems (5X507)
(5X203) Electrical Technology (4+2)	Non- Exam (0+2)	Non Exam Course (0+2)	(5X413) Visual Basic (0+2)	(5X415) Dig.Ckt.Sys. (5X416) Control Sys. (5X417) Bio.Inst. (3+2)	Industrial Automation (5X506) Digital Signal Processing (3+2)
			(5X208) Professional Practices (0+2)		
30	28	32	34	30	30
30	58	90	124	154	184

TERM WISE COURSE STRUCTURE
Program: Diploma in Electronics & Telecommunication
Semester I

Sr. No	Course Code	Course Name	Course Abbr.	Teaching Scheme			Examination Scheme					
				TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5G101	Basic Mathematics	BMT	04	--	04	20	80	--	--	--	100
02	5G103	Engineering Physics	EPH	03	02	05	20	80	25	25		150
03	5G301	English	ENG	02	02	04	20	80	---	25	--	125
04	5G106	Engineering Graphics	EGP	02	02	04	--	--	50	50	---	100
05	5G107	Basics of Computer System	BCS	01	02	03	--	--	50	50	---	100
06	5X201	Components & Testing	C&T	00	04	04	--	--	---	25	25	50
07	5X203	Electrical Technology	ETG	04	02	06	20	80	--	25	25	150
Total				16	14	30	400		375			775

Total Credits: 30

Total Marks: 775

Program: Diploma in Electronics & Telecommunication

Dept.coordinator

HOD

Incharge CDC

Semester II

Sr.No.	Course Code	Course Name	Course Abbr	Teaching Scheme			Examination Scheme					
				TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5G102	Engineering Mathematics	EMT	04	--	04	20	80	--	--	--	100
02	5G104	Engineering Chemistry	ECH	03	02	05	20	80	25	25	--	150
03	5X204	Electronic Devices and Circuits I	EDC I	04	02	06	20	80	25	25	--	150
04	5G302	Communication Skills	CMS	01	02	03	--	--	--	50	25	75
05	5X205	Digital Electronics	DET	03	02	05	20	80	25	25	--	150
06	5G105	Workshop Practice	WSP	00	03	03	--	--	--	50	---	50
07		Non- Exam course		00	02	02			--	--	--	--
Total				15	13	28	400		275			675

Total Credits: 28**Total Marks: 675****Program: Diploma in Electronics & Telecommunication**

Dept.coordinator

HOD

Incharge CDC

Semester III

Sr.No.	Course Code	Course Name	Course Abbr	Teaching Scheme			Examination Scheme					
				TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5X206	Circuit and Network	CNW	03	02	05	20	80	--	25	25	150
02	5X301	C Programming	CPR	02	04	06	20	80	25	25	--	150
03	5X403	Principles of comm. Engg.	PCE	04	02	06	20	80	25	25	--	150
04	5X405	Electronic Devices & Circuits II	EDCII	04	02	06	20	80	25	25	--	150
05	5X202	Electronic Measurement & Instruments	EMI	03	02	05	20	80	25	25	--	150
06	5G304	Environmental Science	ENS	02	00	02				50		50
07		Non-Exam course		00	02	02						
Total				18	14	32	500		300			800

Total Credits: 32**Total Marks: 800**

Program: Diploma in Electronics & Telecommunication

Semester IV

Sr.No.	Course Code	Course Name	Course Abbr	Teaching Scheme			Examination Scheme					
				TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5G305	Industrial Management	INM	03	02	05	20	80	--	25	25	150
02	5X401	Signals & systems	S&S	03	02	05	20	80	--	25	25	150
03	5X402	Linear Integrated Circuits	LIC	03	02	05	20	80	25	25	--	150
04	5X408	Telecommunication Switching Systems	TES	03	02	05	20	80	--	25	25	150
05	5X404	Microprocessor	MPU	04	02	06	20	80	25	25	--	150
06	5X413	Visual Basic	VB	00	02	02	--	--	--	25	25	50
07	5X207	Electronics Workshop	EWS	00	04	04	--	--	--	50	50	100
07	5X208	Professional Practices	PPR	---	02	02	---	---	---	50	---	50
Total				16	18	34	500			450		950

Total Credits: 34

Total Marks: 950

Program: Diploma in Electronics & Telecommunication

SEMETER V

Dept.coordinator

HOD

Incharge CDC

Sr.No.	Course Code	Course Name	Course Abbr	Teaching Scheme			Examination Scheme					
				TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5G303	Entrepreneurship Development	END	01	02	03	--	--		25	25	50
02	5X411	Seminar	SEM	00	02	02	--	--	--	50	50	100
03	5X414	Microwave & Satellite Communication	MSC	03	02	05	20	80		25	25	150
04	5X504	Microcontrollers	MIC	03	02	05	20	80		25	25	150
05	5X406	Power Electronics	PET	03	02	05	20	80		25	25	150
06	5X407	Digital Communication	DCM	03	02	05	20	80	-	25	25	150
07	Any one from Group A											
a)												
b)	5X415	Digital Circuits & Systems	DCS	03	02	05	20	80		25	25	150
c)	5X416	Control System	COS	03	02	05	20	80		25	25	150
d)	5X417	Biomedical Instrumentation	BIS	03	02	05	20	80		25	25	150
Total				16	14	32	500		400		900	

Total Credits: 30

Total Marks: 900

**Program: Diploma in Electronics & Telecommunication
Semester VI**

Sr.No.	Course	Course Name	Course	Teaching Scheme	Examination Scheme
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Dept.coordinator

HOD

Incharge CDC

	Code		Abbr	TH	Pr	Cr	PT	TH	Pr	TW	Or	Total
01	5X410	Computer Hardware & Networking	CHN	02	04	06	--	--	--	50	50	100
02	5X412	Project	PRO	00	04	04	--	--	--	100	50	150
03	5X501	Mobile & Fiber Optic communication	MFO	03	02	05	20	80	-	25	25	150
04	5X502	Electronic Circuit Design	ECD	03	02	05	20	80	-	25	25	150
05	5X503	Audio/Video Systems	AVS	03	02	05	20	80	-	25	25	150
06	Any one from Group B											
a)	5X505	Microcontroller based system	MBS	03	02	05	20	80	-	25	25	150
b)	5X506	Digital Signal Processing	DSP	03	02	05	20	80	-	25	25	150
c)	5X507	Industrial Automation	IAU	03	02	05	20	80	-	25	25	150
Total				14	16	30	400		450		850	

Total Credits: 30

Total Marks: 850

COURSE CODE: 5G101

COURSE NAME: BASIC MATHEMATICS (BMT)

Particulars	Theory		Practical	PR	T.W.	Oral	Total
	Credit						
	04		00				04
	Prog. Test	End Exam	----	----	----	----	100
Marks	20	80					
Exam. Duration	01	03					

COMPETENCY STATEMENT(S):

Dept.coordinator

HOD

Incharge CDC

To inculcate the practice of Mathematics

RATIONALE:

The subject is classified under basic sciences and intends to teach students basic facts, concepts and principles of mathematics, as a tool to analyze Engineering problems. Mathematics lies down the foundation to understand core technology subjects.

OBJECTIVE:

The students will be able to:

- Develop process of logical thinking
- Comprehend the principles of other subjects
- Solve problems by using analytical and systematic approach.

CONTENTS:

Topic no	Contents	HRS	MARKS
01	1. Algebra 1.1 logarithms 1.2 Definition natural and common logarithms. 1.3 Laws of logarithms 1.4 Simple numericals on logarithms	04	04
02	2. Determinant 2.1 Definition of Determinant, Order of Determinant 2.2 Expansion of Determinant of order 2 and 3 2.3 Properties of Determinant 2.4 Cramer's Rule (solution of simultaneous equations in two and three Unknowns)	08	08
3	3. Partial fractions 3.1 Definition of Partial fraction, proper and improper fractions, rational fractions 3.2 To resolve given rational fraction into partial fractions 3.3 Denominator containing Non repeated linear factors 3.4 Denominator containing repeated linear factors 3.5 Denominator containing irreducible non-repeated quadratic Factors	06	08
4	4. Matrices 4.1 Definition of matrix: Type of matrix: viz.- null, row, column, square, diagonal, scalar, unit, Triangular. 4.2 Algebra of matrices – addition, subtraction and multiplication 4.3 Transpose of a matrix 4.4 Adjoint of a matrix 4.5 Inverse of matrix by adjoint method	08	10
5	5. Trigonometry 5.1 Trigonometric ratios of allied, compound and multiple angles 5.2 Trigonometric Ratios of allied angles 5.3 Trigonometric Ratios of compound angles 5.4 Trigonometric Ratios of multiple angles 5.5 Product, sum and difference formulae	10	16
6	6. Inverse circular functions 6.1 Definition of Inverse circular functions 6.2 Principle values of Inverse circular functions 6.3 simple problems	04	08

7	7. Properties of Triangles 7.1 Sine rule, Cosine rule 7.1 Tangent rule (without proof) 7.2 Simple problems	06	06
8	8 Calculus 8.1 Cartesian products of sets. 8.2 Definition of relation, definitions of function, real value function, domain, co-domain of a functions 8.3 Types of Function. 8.4 Value of the function at given point 8.5 Composite function	08	08
9	9.Limits 9.1 Definition and concept of limit 9.2 Limits of algebraic functions 9.3 Limits of trigonometric functions 9.4 Limits of exponential functions 9.5 Limits of logarithmic functions	10	12

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Mathematics for polytechnic students for first year	By S.P.Deshpande
2	Mathematics for polytechnic students for first year	By G.V.Kumbhojkar
3	Mathematics for polytechnics	By TTTI Bhopal
4	Applied Mathematics	By Gore and Patil
5	Trigonometry Part I	By Loney

COURSE CODE: 5G102**COURSE NAME: Engineering Mathematics (EMT)**

Particulars Credit	Theory		Practical	PR	T.W.	Oral	Total
	Prog. Test	EndExam					
	04		00				04
Marks	20	80	----	----	----	----	100
Exam. Duration	01	03					

CONTENTS:

Chapter	Name of the topic/Chapter	Hours	Marks
1	1.Derivatives 1.1 Definition of derivative, notation. 1.2 Derivative of standard functions. 1.3 Rules of Differentiation (without proof) such as sum, difference, product and quotient. 1.4 Derivative of composite functions. 1.5 Derivative of inverse trigonometric functions.	18	26

	1.6 Derivative of implicit functions. 1.7 Derivative of parametric functions. 1.8 Logarithmic differentiation. 1.9 Second order derivatives. 1.10 Simple applications of derivative such as equation of tangent & normal, maxima & minima, radius of curvature.		
2	2. Integration 2.1 Definition of integration. 2.2 Integration of standard function. 2.3 Rules of Integration: sum, difference & multiplication. 2.4 Methods of Integration. 2.4.1 Integration by substitution. 2.4.2 Integration by partial fraction. 2.4.3 Integration by parts. .5 Definition of Definite integral. 2.6 Simple problems on definite integral.	18	22
3	3 Differential Equations 3.1 Definition of differential equation, order°ree. 3.2 Formation of differential equation. 3.3 Solution of Diff. equation. 3.3.1 Variable separable. 3.3.2 Homogeneous equation. 3.3.3 Exact diff. equation. 3.3.4 Linear diff. equation.	14	16
4	4 Statistics 4.1 Graphical representation: Histogram & Ogive curve to find Mode and median. 4.2 Measures of dispersion : Range, mean deviation and Standard deviation.	06	08
5	5 Probability. 5.1 Introduction & definitions of different terms permutation & combination. 5.2 Definition of probability. 5.3 Addition Theorem of probability. 5.4 Multiplication Theorem. 5.5 Conditional probability.	08	08

Reference books

1	Mathematics for polytechnic students for second	Year –By S. P. Deshpande
2	Applied Mathematics	By Gore & Patil
3	Applied Mathematics	By Patel & Rawal
4	Fundamentals of Mathematical statistics	By S.C.Gupta & Kapoor

COURSE CODE:5G103
COURSE NAME: ENGINEERING PHYSICS (EPH)

Teaching scheme		Evaluation scheme						
TH	03		PT	TEE	TW	PR	OR	TOTAL
PR	02	MAX MARKS	20	80	25	25	--	150
TOTAL	05	DURATION	01	03				

COMPETENCY STATEMENT :

The Student will be able to:

- Analyze different factors on which accuracy depends.
- Differentiate between scalars and vectors
- Describe principle and working of Laser.
- Differentiate between conductor, insulator and semiconductor on the basis of band theory

RATIONALE:

Physics provides foundation for core technology subjects. Understanding of any subject is entirely depending on logical thinking and hierarchy of knowledge component. As Physics is considered as basic science its principles, laws, hypothesis, concepts, ideas are playing important role in reinforcing the knowledge of technology.

Deep thought is given while selecting topics in physics. They are different for different groups. This will provide sound background for self-development in future to cope up with new innovations. Topics are relevant to particular programme and student will be motivated to learn and can enjoy the course of Physics as if it is one of the subjects of their own stream.

Topic no	Contents	Hrs	Marks
01	<p>UNITS AND MEASUREMENTS</p> <p>1.1 Definition of unit , requirements of standard unit, fundamental and derived quantities and their units</p> <p>1.2 Definition of accuracy, precision and error, estimation of errors – absolute error, relative error and percentage error, rules and identification of significant figures.</p> <p>1.3 Scalars & Vectors: Definition, laws of Vectors (Law of Triangle, law of parallelogram). (Numerical on percentage error and significant figures, Law of parallelograms)</p>	07	12
02	<p>KINEMATICS</p> <p>2.1 Angular Motion: Definition of Angular displacement, angular velocity, angular acceleration, Relation between angular velocity and linear velocity, definition of S.H.M</p> <p>2.2 Kinetics: Definition of momentum, impulse, impulsive force, Statements of Newton's laws of motion with equations, Application of laws of motion-Recoil of gun, Motion of two connected bodies by light inextensible string passing over smooth pulley, motion of lift.</p> <p>2.3 work power & energy. Definition of work, power & energy equation for potential energy & kinetic energy, work done by a torque.</p>	08	10

03	<p>GENERAL PROPERTIES OF MATTER</p> <p>3.1 Elasticity Deforming force, restoring force, elastic and plastic body, stress and strain with their types. Elastic limit, Hooke's law, Young's modulus, bulk modulus, modulus of rigidity and relation between them (no derivation), (Numerical on stress, strain and Young's modulus)</p> <p>3.2 Surface Tension. Molecular force, cohesive and adhesive force, Molecular range , sphere of influence, Laplace's molecular theory, Definition of surface tension and its S.I.unit,angle of contact, capillary action with examples,relation between surface tension , capillary rise and radius of capillary (no derivation),effect of impurity and temperature on surface tension (Numerical on relation between surface tension, capillary rise and radius)</p> <p>3.3 Viscosity Viscous force, Definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its S.I. unit, free fall of spherical body through viscous medium (no derivation) terminal velocity, Stokes law (statement and formula). (Numerical on coefficient of viscosity and Stroke's formula)</p>	14	20
04	<p>HEAT</p> <p>4.1 Transmission of heat and expansion of solids Three modes of transmission of heat -conduction, convection and radiation,steady state coefficient of Thermal conductivity and its S.I. unit, Definition of linear,Aerial and cubical expansion and relation between them.(no derivation)</p>	02	04
05	<p>LIGHT, LASER and SOUND</p> <p>5.1 Properties of light Reflection, refraction, and their laws, Snell's law, physical significance of refractive index, definition of dispersion, polarization and diffraction of light along with ray diagram</p> <p>5.2 LASER Properties of laser,absorption, spontaneous and stimulated emission, population inversion,optical pumping,active system(concept and definations) construction and working of He-Ne laser,application of lasers(medical and engineering)</p> <p>5.3 Sound Definition of wave motion, amplitude, period, frequency, and wavelength, relation between velocity, frequency and wavelength , equation of progressive wave (no derivation), longitudinal and transverse wave, comparison, forced and free vibrations, definition of resonance with examples, formula for velocity of sound with end correction (no derivation) (Numerical on relation $v = n\lambda$ and resonance)</p>	06	12

06	ELECTROSTATICS 6.1 ELECTROSTATICS Coulomb's Inverse square law, intensity of electric field, Electric lines of force & their properties, flux, flux density. Statement and general equation of Ohms law - Resistances in series & parallel Specific resistance ,Principle of Wheatstone's bridge. Principle of potentiometer 6.2 ELECTRIC POTENTIAL AND ELECTRIC CAPACITANCE: Principle of capacitance and its unit, condensers in series & parallel, (Numericals on condensers)	04	08
07	7.1 SEMICONDUCTORS: Classification of conductors,insulators,semiconductors on the basis of energy bands ,p-type & n-type semiconductor, p-n junction diode and biasing of p-n junction diode (forward and reverse)	03	06
08	MODERN PHYSICS. 8.1 Photo electricity Concept of photon, Plank's hypothesis, properties of photon, photo electric effect, Characteristics of photoelectric effect, work function, Einstein's photoelectric equation(no derivation), photoelectric cell- applications. (Numerical on Energy of photon, work function,Photoelectric equation) 8.2 X-rays Introduction to x-rays, types of x-rays ,production of x-rays using Coolidge tube, minimum wavelength of x-rays,(no derivation) properties of x-rays, engineering, medical and scientific applications. (Numerical on minimum wavelength of x-rays)	04	08

PRACTICALS

Skills to be developed

1) Intellectual skills-

- _ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement.
- _ Analyze properties of matter & their use for the selection of material.
- _ To verify the principles, laws, using given instruments under different conditions.
- _ To read and interpret the graph.
- _ To interpret the results from observations and calculations.
- _ To use these results for parallel problems.

2) Motor skills-

- _ Proper handling of instruments.
- _ measuring physical quantities accurately.
- _ To observe the phenomenon and to list the observations in proper tabular form.
- _ To adopt proper procedure while performing the experiment.
- _ To plot the graphs.

List of Experiments:

- 1) To know your Physics Laboratory.

- 2) To use Vernier Caliper for the measurement of dimensions of given object.
- 3) To use Micrometer Screw Gauge for the measurement of dimensions (Thickness, Diameter) of given object.
- 4) To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
- 5) To verify Law of Parallelogram.
- 6) To determine coefficient of viscosity of given fluid (Glycerin) using Stoke's Method.
- 7) To determine the velocity of sound by using resonance tube.
- 8) Determination of specific resistance by Voltmeter-Ammeter method.
- 9) Determination of Law of resistance in Parallel by meterbridge.
- 10) Comparison of E.M.F by Single Cell method.
- 11) Determination of Law of resistance in series by meterbridge.

Reference books:

1. Physics-I ,V. Rajendran Tata McGraw- Hill publication, New Delhi
2. Applied physics By Arthur Beiser, Tata McGraw- Hill Publication, New Delhi
3. Delhi
4. Engineering Physics by R.K.Gaur and S.L.Gupta Dhanpat Rai Publication New Delhi.
5. Fundamentals of Physics Resnick ,Halliday & Walker ,Wiley India Pvt. Ltd
6. Applied physics by G.B. Bhandarkar.Nirali publication.
7. Basic physics by Pawar and Sutar Nirali Publication
8. S Chand's Basic Physics

COURSE CODE: 5G104**COURSE NAME: - ENGINEERING CHEMISTRY**

Teaching scheme		Evaluation scheme						
TH	03		PT	TH	TW	PR	OR	TOTAL
PR	02	MAX MARKS	20	80	25	25	--	150
TOTAL	05	DURATION	01	03				

RATIONALE:

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering materials, their properties, related applications & selection of materials for engineering applications. Due to technological progress there are hazardous effects on environment & human life. The core knowledge of environmental effects will bring awareness in students about the precautions & preventions to be taken to reduce the ill effects. This subject will generate curiosity of carrying out further development in engineering field

COMPETANCEY STATEMENT:

The student will be able to:

1. Draw the orbital configuration of different elements.
2. Represent the formation of molecules schematically.
3. Describe the mechanism of electrolysis.
4. Identify the properties of metals & alloys related to engineering applications.
5. Identify the properties of non metallic materials, related to engineering applications.
- 6 Select a proper material for specific purpose.

Contents

Topic no	Contents	HRS	MARKS
01	<p>Atomic structure</p> <p>1.1 Definition of Atom, element, molecule, introduction to different atomic theories,</p> <p>1.2 Bohr's atomic theory, Fundamental Particles of Atom their Mass, Charge, Location,</p> <p>1.3 Atomic no, Atomic Mass no. numerical problems on it, orbit & orbitals,</p> <p>1.4 Electronic configuration, electronic configuration of first 30 elements</p> <p>1.5, Isotopes & Isobars,</p> <p>1.6 Inert gases, Their characteristics, electronic configuration</p> <p>1.7 Molecule formation: valency, types of valency, electrovalency co valency. Its examples. Formation of Electrovalent compounds e.g. NaCl, CaCl₂, formation of Covalent Compounds H₂O, Cl₂, C₂H₄, C₂H₂.</p>	08	10

02	Electrochemistry 2.1 Definition & differentiation of Atom, Ion. 2.2 Ionization & Electrolytic dissociation, Arrhenius Theory of Ionization, Degree of Ionization & factors affecting degree of ionization. 2.3 Introduction of Conductors, Insulators, Dielectrics, Electrolyte, NonElectrolyte, 2.4 Electrolysis, Electrolytic Cell, Electrodes. Mechanism of Electrolysis 2.5 Electrochemical Series for Cations & Anions, 2.6 Electrolysis of CuSO ₄ Solution by using Cu Electrode & Platinum Electrode 2.7 Faraday's first & second law of Electrolysis & numerical problems on it Applications of Electrolysis such as Electroplating & Electro refining 2.8 Electrochemical Cells & Batteries, Types of cell Primary & secondary cell construction Working & Applications of Dry cell & Lead – Acid Storage.	06	12
03	METALLURGY 3.1 Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Occurrence of Metals, 3.2 Mechanical Properties of metals such as Hardness, Toughness, Ductility, Malleability, Tensile strength, 3.3 Stages of Extraction of Metals from its Ores in detail i.e. Crushing, Concentration, methods of concentration (physical and chemical) 3.4 Reduction of iron in blast furnace with chemical reactions, Reactions in zone of reduction and zone of absorption, 3.5 Alloys: Definition of Alloy, Purposes of Making alloy. 3.6 Methods of Preparation of alloy such as fusion method. 3.7 Classification of Alloys, ferrous alloys & Non Ferrous alloys, their examples. 3.8 Composition, Properties & Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood's Metal	08	14
04	Corrosion of metals and its protection 4.1 corrosion: Definition of corrosion, Types of corrosion 4.2 Atmospheric corrosion or dry Corrosion, corrosion due to oxygen, different film formation, 4.3 Immersed Corrosion or Electrochemical Corrosion, oxygen absorption Mechanism, Hydrogen evolution mechanism 4.4 Protection of Metals from corrosion. Purification of Metals from corrosion, Alloy Formation, Cathode Protection Applying Protective Coatings like metal coating by Galvanizing, Tinning, Electroplating.	06	08
05	WATER 5.1 Sources of water, impurities in water, 5.2 Hard water & soft water, types of hardness, causes of hardness, 5.3 Effects of hard water in boiler, scale & sludge formation in boiler its effects on boiler,	07	10

	<p>5.4 Effects of hard water in diff. industries and domestic purposes,</p> <p>5.5 Softening of hard water by soda lime process, permutite process, ion exchange process,</p> <p>5.6 Potable water its condition for portability,</p> <p>5.7 Diff. methods of purification of water</p>		
06	<p>Non Metallic Materials</p> <p>6.1 Plastics Definition of Plastic, Formation of Plastic by Addition Polymerisation with example such as Polyethylene</p> <p>6.2 Condensation Polymerisation with suitable example such as Bakelite plastic.</p> <p>6.3 Types of Plastics, Thermo softening & Thermosetting Plastic,</p> <p>6.4 Compounding of Plastics – Resins, Fillers, binders ,Plasticizers, Accelerators, Pigments etc. .Engineering properties of plastic and its related uses.</p> <p>6.5 Rubber Natural Rubber, Its Processing, Drawbacks of Natural Rubber,</p> <p>6.6 Vulcanisation of Rubber with Chemical Reaction.</p> <p>6.7 Synthetic Rubber its examples Buna –S & Buna –N rubber, Distinction Between Natural & synthetic rubber.</p> <p>6.8 Properties of rubber such as Elasticity, Tack, resistant to abrasion, Rebound capacity.</p> <p>6.9 Engineering Applications of rubber based on their properties.</p> <p>6.10 Thermal Insulating Materials Definition & Characteristics of Thermal insulators. Preparation, Properties & Applications of Thermocole & glass wool, cork, asbestos.</p>	07	18
07	<p>Lubricants-</p> <p>7.1 Definition of lubricant, lubrication,</p> <p>7.2 functions of lubricants ,need of lubrication</p> <p>7.3 Classification of lubricants with examples,</p> <p>7.4 Mechanism of Lubrication by Fluid Film, Boundary & Extreme Pressure,</p> <p>7.5 Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, Cloud & Pour Point.</p> <p>7.6 Chemical Characteristics such as Acid Value , Neutralization Number, Emulsification, Saponification Value, Selection of proper Lubricants for Various Types of Machines.</p>	06	08

List of practicals (ANY 10 SHOULD BE PERFORM)

01) Orbital configuration of different elements (at least 10 elements)

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- 02) To verify Faraday's first Law of electrolysis.
- 03) To determine neutralization point of acetic acid (weak acid) and ammonium hydroxide (Weak base). calculate the normality and strength of acetic acid.
- 04) To determine the equivalent point of precipitation titration of BaCl₂ with H₂SO₄ using Conductivity Meter. To find the normality and strength of BaCl₂
- 05) To find the strength in grams per liter of the given solution (NaOH) with the help of standard hydrochloric acid.
- 06) To determine pH value of given solutions, water samples, by using pH paper, universal indicator and pH meter.
- 07) To determine the strength of given hydrochloric acid solution by titrating it against standard potassium hydroxide solution.
- 08) To determine percentage of iron from steel by titration method.
- 09) To determine the hardness of potable water and boiler feeding water.
- 10) To determine the chloride content potable water and boiler feeding water.
- 11) Preparation of phenol formaldehyde plastic.
- 12) To determine the acid value of oil sample by neutralization method.
- 13) Qualitative analysis of given salt solutions, i.e. to determine one acidic and one basic radical from given salt solution. (At least 05 salt solutions.)

TEXT BOOKS & REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Chemistry of engineering materials	S.S.Narkhede	Nirali publication
2.	Chemistry of engineering materials	Shane patil	Tata tech publication
3	Chemistry of engineering materials	Jawale	Mc vranda publication. Inc.
4.	Engineering Chemistry	Jain & Jain	Dhanpat Rai and Sons Co.
5.	Engineering Chemistry	R.S., S. S. Dara	S. Chand Publication
6.	Environmental Chemistry & Pollution Control	S. S. Dara	S.Chand Publication

WORKSHOP PRACTICE (WSP)
COURSE STRUCTURE: 5G105

Teaching Scheme		Evaluation Scheme						
TH	00		PT	TH	TW	PR	OR	Total
PR	03	Max. Marks	--	--	50	--	--	50
TOTAL	03	Duration	--	--	--	--	--	--

RATIONALE:

The knowledge of different basic tools and different processes such as smithy, forging, carpentry, welding, plumbing, fitting etc. is the basic requirement of the diploma technician. These are the basic & fundamental operations encountered in workshop. At this level it is essential to impart the practical feel of these basic operations & processes to the students. With this intention this course is being introduced.

COMPETENCY STATEMENTS:

1. To understand use of different hand tools and workshop processes.
2. To perform basic workshop processes such as smithy, forging, carpentry, welding, plumbing, fitting.

COURSE CONTENTS:**TERM WORK:**

- 1) **Smithy & Forging:** - One job involving cutting, bending, drawing down/ up operations.
- 2) **Carpentry:** - One Job involving Different types of carpentry joints (min. two joints) used in furniture, wooden items with the use of teak wood, combination of wood & steel frames, plywood, and sun mica.
- 3) **Welding:** - One job welded joint involving operations such as Lap, Butt welding with the help of Arc Welding machine
- 4) **Fitting & Filing:** - Fitting and filing one job involving filing, chamfering, drilling, tapping etc. operations
- 5) **Plumbing:** - One practical job on pipe fitting and threading

Job diary, drawing of different types of tools, operations are to be submitted by each candidate.

TEXT BOOK:

Sr.No	Title and Edition	Author	Publisher
1	Workshop technology Vol. 1	B.S. Raghuwanshi	
2	Workshop technology Vol. 1	S.K. Hajra Choudhary	
3	Production technology	R.K. Jain.	

ENGINEERING GRAPHICS (EGP)

Course Code: (5G106)

COURSE STRUCTURE:

Teaching Scheme		Evaluation Scheme						
TH	02		PT	TH	TW	PR	OR	Total
PR	02	Max. Marks	--	--	50	50	--	100

TOTAL	04	Duration	--	--	--	2hrs	--	--
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RATIONALE:

Engineering drawing (Graphics) is the language of engineers. Often it is required to imagine the different objects from various directions, sound knowledge of engineering graphics will help the engineer to represent various objects and read various drawings used in workshop, industry and in various manufacturing processes.

COMPETENCY STATEMENT:

To understand the basic principles of Engineering Drawing

COURSE CONTENTS:

Topic No.	Content	Hours	Marks
1.	Introduction 1.1 Drawing Instruments and their uses 1.2 Letters and numbers (single stroke vertical) for main title, subtitle and normal use 1.3 Different types of lines, Convention of lines and their applications. 1.4 Scale (reduced, enlarged & full size), Plain scale and Diagonal scale. 1.5 Sheet sizes and layout, Geometrical constructions 1.6 Dimensioning, its methods, parallel and chain dimensioning, radius and diameter dimensioning, leader and its use, dimension with text	04	
2.	Simple Drawing Practices 2.1 Drawing of different circles with thin, thick, center line use, dividing circle into number of equal parts, dividing line into equal parts 2.2 Drawing pentagon, hexagon and rhombus, drawing correct arrows to dimension lines, drawing tangent to circle from given point	04	
3.	Engineering Curves 3.1 To draw ellipse by – <ul style="list-style-type: none"> • Arcs of circle method • Concentric circle method • Oblong method 3.2 To draw parabola by – <ul style="list-style-type: none"> • Directrix focus method • Rectangle method 3.3 To draw hyperbola by – <ul style="list-style-type: none"> • Transverse axis & focus method. • Passing through a given point. (Rectangular hyperbola) 3.4 To draw involute of square, hexagon and circle. 3.5 To draw cycloid, epicycloid, hypocycloid.	08	
4.	Orthographic Projections 4.1 Converting pictorial view into orthographic views (First angle method of Projection), 4.2 Sectional orthographic projection of simple objects	08	
5.	Isometric Projections 5.1 Isometric projection of simple objects 5.2 Isometric projection of objects having circular holes	08	

LIST OF PRACTICAL/EXPERIMENTS:

A3 size sketch book should be used by the students. It is necessary to draw all the sheet problems in sketch book first and then redrawn on the sheets

1. One sheet on types of lines, letters, numbers and scales.
2. One sheet on Engineering curves, (Minimum 4 curves).
3. One sheet on Orthographic Projection, (Minimum 2 objects) by first angle method
4. One sheet on Isometric projection of simple object (Minimum 2 objects).
5. One sheet on geometrical constructions which includes all additional drawings given in chapter 5.

PRACTICAL EXAMINATION:

At the end of term practical examination of 50 marks of 2 Hours duration is compulsory to all students. External and Internal Examiners should set and assess the Question paper jointly as per following guidelines

- | | |
|---|----------|
| a) Engineering curves (Solve any one out of two given) | 10 marks |
| b) Geometrical construction & scales (Solve any one out of two given) | 10 marks |
| c) Orthographic Projections (One Problem) | 15 marks |
| d) Isometric projections (One Problem) | 15 marks |

TEXT BOOKS:

Sr. No	Title and Edition	Author	Publisher
1	Engineering Drawings	N. D. Bhatt	Charotar Publishing House
2	Engineering Drawings	Sidheshwar, S hastri	Tata Mc Graw Hill
3	Engineering Drawing	R. V. Mali	Vrinda Publication

COURSE CODE: 5G107

COURSE NAME: **BASICS OF COMPUTER SYSTEMS**

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	01	02	--	--	03

	Prog. Test	End Exam				
Marks	--	--	50	50	--	100
Exam Duration	--	--	03			

COMPETENCY STATEMENTS:

- **To understand working & use of Computer for day-to-day use.**
- **To use computer for word processing, accounting related applications**
- **To prepare professional presentations.**
- **To understand and use Internet.**

RATIONALE:

With rapid development of Technology and competitive economy, computers play very important role in the diversified fields such as computer aided design of circuits, power generation, image processing, telecommunication modeling and simulation etc. The built in characteristics of computers have made them inevitable in different applications areas. So it is essential for a Diploma Technician to have a knowledge regarding computers and develop a skill to handle different software's available. It is always essential for a technician to update their knowledge to cope up with the fast development in software's. Considering this in view and duties to be performed by Diploma Technician in professional life, following curriculum is suggested.

COURSE OBJECTIVES:

Student should able to,

- Understand working of computers
- Get knowledge of various components of computers.
- Understand concept & functions of Operating System.
- Perform file management operations using My computer & Windows Explorer
- Print the letter using MS Word
- Perform worksheet operations using MS Excel
- To prepare professional presentations using MS PowerPoint
- Use Internet for Create E-mail id, receive & send E-mail with attachment
- Search for the information on Internet.

Topic	contents	Hours	Marks
1	1.Fundamentals of Computers 1.1 Types of computer, Block Diagram showing components of computer, 1.2 Input devices, output devices, CPU, 1.3 Primary Memory, Secondary memory.,(usage of memory) 1.4 processor and its speed, RAM, Monitor, Display card, 1.5 Hard Disk, Floppy drives, CD drive, Sound card, etc. (Use of each) 1.6 Hard ware and software, 1.7 Types of software. Concept of Operating System: Definition, functions and examples of operating system (like DOS, WINDOWS, Linux).	02	
2	Windows 2.1 Bios, Power on self-test.. 2.2 Concept of file & directory, rules for file & directory names. 2.3 WINDOW 98/2000/XP 2.4 introduction Starting Windows, Desktop, Icons, Task bar, Short	03	

	<p>cuts, The start Button, Arranging windows, Shutting down windows.</p> <p>2.5 Windows Explorer: Creating, renaming, deleting Folders/ file. Copying, moving, deleting, renaming files, Using Send to, Search files and folders, Recycle bin</p> <p>2.6 Windows Setting: Date format, adding printer.</p> <p>2.7 Windows Accessories: Calculator, Notepad, paint, word pad.</p>		
3	<p>Ms-Word</p> <p>3.1 Introduction to word processing, Introduction to MS word. Opening, Saving, closing a file.</p> <p>3.2 Page setup: Changing Margins, layout, and paper size. Formatting Text:</p> <p>3.3 Tables: Insert table, enter and edit data into table.</p> <p>3.4 Printing: Print preview, selecting printer, and print options.</p>	03	
4	<p>Ms-Excel</p> <p>4.1 Introduction to electronic spreadsheet. Introduction to MS Excel.</p> <p>4.2 Components of MS Excel window like Title bar, Menu bar, Formula Bar, Status bar,</p> <p>4.3 Worksheet area, Sheet Tabs, Columns, rows. Hiding and viewing Toolbars like standard and formatting tool bars. Entering data, copying, moving, Editing cell entries use of auto fill Saving, closing and opening file.</p> <p>4.4 Page setup: Changing Margins, layout, and paper size. Enter formula, copy formula using fill handle Inserting functions.</p> <p>4.5 Use of functions like SUM, AVERAGE, MIN, IF, COUNT, LOG, SIN, COS, ROUND, SQRT, PI etc.</p> <p>4.6 Formatting data: Change number format, alignment, borders, font, size etc. Use auto Format,</p> <p>4.7 Restructuring worksheet: Inserting and deleting the columns and rows. Changing column width, row height.</p> <p>4.8 Charts (Graphs): Types of charts, creating and modifying charts, printing charts.</p>	04	
5	<p>PowerPoint</p> <p>5.1 Overview, Using design template and auto content wizard,</p> <p>5.2 Creating presentation, slides and its types, slide operations, modifying & running presentation, adding & editing objects, creating tables, charts & Diagram, save & print option ,custom presentation, applying transition & animation effects.</p>	02	

6	<p>Internet:</p> <p>6.1 Introduction: Uses of internet,</p> <p>6.2 Resources required using Internet. Internet Service Provider: Need & Duties of ISP, 6.3 Connecting to Internet, Domain & addresses,</p>	02	
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Internet Browsers, Search engines , Email, Chat		
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List Of Practicals:

1. List and identify the peripheral devices of a PC. Connect the keyboard, mouse, printer, monitor and scanner to a computer. Get the information about the manufacturers and prices of various components of a PC.
2. **Windows**
Start and shutdown of windows. Starting different applications. Using applications like calculator, paint, word.
Observe various features of windows like menus, push buttons, drop down list, check boxes, option buttons etc.
Perform file management operations such copying, deleting, renaming, creating folders, renaming folders using My computer, Windows Explorer, searching files and folders.
Change windows format such as wall paper, date & time format, Installing printer, installing & removing programs by using add /remove programs, change display properties.
3. **Microsoft Word**
 - Prepare a sample bio data
 - Write an application for job
 - Prepare a time table in tabular format.
4. **Microsoft Excel**
Create a sample result sheet of your class.
Create salary sheet for Employees (Apply Excel formulae/ functions to solve problems.)
5. **Internet**
 - Creation of email account
 - Send E-mail, Receive E-Mail. (use attachment)
 - Management of email account.
 - Searching information on internet
6. **PowerPoint**
 - Creating PowerPoint presentation, Running presentation.
 - Applying design template, background, transition effects, animation slide.
 - Preparing custom presentations and using pack and go features.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Fundamentals of Computers	P.K.Sihna BPB Publication
2	Teach Yourself Windows 98	Greg Perry Techmedia
3	Teach Yourself Windows 98	Cassel & Hart Techmedia
4	Windows 98 Bible	Alen Simpson BPB Publication
5	MS Office 2000	Ed Bott Woody Ceonhard (PHI)
6	Microsoft Office	Ron Mansfield BPB Publication
7	Teach Yourself MS Office 97	Greg Perry Techmedia

COURSE CODE: 5X201

COURSE NAME: COMPONENT AND TESTING

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	00		04	--	--	04
	Prog. Test	End Exam				
Marks	--	--	--	25	25	50
Exam Duration	--	--				

COMPETENCY STATEMENTS:

- To develop ability of testing various electronic Components.
- To get acquainted with commonly used electronic laboratory Equipments related to testing of components & Measurement of current, Voltage, resistance, capacitance etc.

RATIONALE:

This course develops the fundamental awareness about various laboratory practices. It gives the exposure to electronic tools, passive devices, active devices and commonly used equipments in various electronic laboratories.

COURSE OBJECTIVES:

Student should able to,

- Understand basic applications of Electronic tools,
- Understand basic handling of instruments,
- Identify and test passive and active components.

CONTENTS:

Chapter No	Topic	Hrs	Marks
1	1.Study of Electronic Tools 1.1 To draw diagrams & to study applications of Pliers, Cutters, Wire Strippers 1.2 To draw diagrams of various types of Screwdrivers and identify their Applications ii) Assignment based on accessories such as insulating tapes, solder metals, solder tapes, fluxes, sleeves and Cleaning fluxes (Theoretical Assignment). 1.3 To introduce soldering techniques and practicing it on zero PCB 1.4 To introduce de soldering techniques and practicing it.	10	
2	Study of Electronic Instruments 2.1 To draw diagram of analog voltmeter and observe various ranges of voltmeter & to learn measurement of voltage using analog voltmeter. 2.2 To draw the diagram of analog ammeter and observe various ranges of ammeter, to learn measurement of current using analog ammeter. 2.3 To draw the front panel of analog Multimeter, to learn various measurements (voltage, current and resistance) using analog multimeter. 2.4 To draw the front panel of digital Multimeter, to learn various measurements (voltage, current and resistance) using digital multimeter. 2.5 To study front panel of power supply and learn its use. 2.6 To study CRO front panel controls, to draw its diagram, to learn the frequency Measurement and amplitude measurement functions of CRO. 2.7 To study the front panel controls of Function generator, to learn the functions of it.	10	
3	Study of Passive Components 3.1 To draw the symbols of R, L, C 3.2 To draw the diagram of various types of switches, relays, cable & probes 3.3 To find the value of resistance using colour codes. 3.4 To study different types of resistors & their important	20	

	specifications 3.5 To find the value of capacitance using colour codes. 3.6 To study different types of capacitors and inductors & their important specifications. 3.7 To study, identify and test different types of switches & to understand various specifications of switches. 3.8 To study, identify and test different types of relays & to understand various specifications of relays. 3.9 To identify and test different types of connectors and probes.		
4	Study of Active Components 4.1 To draw the symbols of various active components, identify and test the diodes, Zener diodes using Multimeter, 4.2 To identify LED and photodiode & test them using Multimeter. 4.3 To identify transistors and test them using Multimeter.	08	
5	Testing of components 5.1. Testing of resistor, capacitor and inductance by using multimeter, LCR Q meter and CRO. 5.2. Testing of transistor by using multimeter, transistor tester and CRO. 5.3. Testing of IC using IC tester. 5.4. Testing of variable resistor, connectors, switches by using multimeter. 5.5. Testing of diode, zener diode, varactor diode, Photo diode, Tunnel diode, LDR, thermistor, 7 segment display, FET, MOSFET, SCR, Triac with the help of Multimeter.	16	

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Electronic Components & Materials	Madhuri Joshi
2	Basic Electronics	A Text Lab Manual Zbar, Malvino, Tata Mc Graw Hill
3	Electronic Materials & Components	K.S.Patil & others , Vrinda Publications

COURSE CODE: 5X202**COURSE NAME: ELECTRONICS MEASUREMENT & INSTRUMENTS**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog.Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To measure parameters of Electronic circuits using measuring instruments & to know various sensors.

RATIONALE:

Students will be able to measure & test any measuring instrument. This will be useful to troubleshoot fault in any equipment. Also student will be able to understand various types of sensors.

OBJECTIVES:

Study of different measuring instruments such as Volt meter, Ohm meter, Multimeter, Wattmeter, CRO, Signal Generator.

Chapter	Name of the topic	Hrs	Marks
1	Fundamental parameters: 1.1 Definition of measurement, accuracy, precision, sensitivity, span, range, 1.2 Errors, types of errors, 1.3 system of units.	02	08
2	AC & DC Measurement: 2.1 DC voltmeter, Ohmmeter: Series and Shunt type, various ranges. 2.2. Analog Multimeter, Block diagram of digital Multimeter. 2.3. AC meters—electrodynamometer type, rectifier type, 2.4. Frequency Meter (Block diagram).	06	12
3	Bridges: 3.1 Circuit diagram, balance equation of Wheatstone bridge, Kelvin's bridge, guarded whetstone bridge, for resistance measurement, inductance, capacitance Measurement using bridge (Maxwell, Hay's, schering). 3.2. Leakage capacitance measurement. 3.3 Frequency Circuit diagram and measurement using Q-meter, LCR meter, 3.4. Numericals based on above.	12	12
4	Cathode Ray Oscilloscope: 4.1 Specifications of oscilloscopes, functional block diagram, CRT, oscilloscope probes (Active and Passive), front panel of CRO. 4.2 Applications of CRO, measurement on CRO: voltages, frequency, phase, time, current, power 4.3 Block diagram of Dual trace and Dual beam Oscilloscope 4.4. Principle and working of sample oscilloscope, Principle of storage oscilloscope, Construction of Storage CRT.	06	12
5	Signal generators: 5.1 Uses of Signal and Function Generator. 5.2. Block diagram and working of Function generator, 5.3. Block diagram and working of RF generator and pattern generator (Monochrome and Colour)	10	12
6	Introduction to transducers: 6.1 Classification and general characteristics of Transducers, active and Passive Transducers.	04	08
7	Transducers : 7.1 Strain gauges, thermistor, capacitive and inductive transducers, LVDT, Thermocouples, Pressure measurement, piezoelectric transducers, PH	08	16

	measurement. 7.2. Digital transducers-shaft encoder, advantages of digital transducer CT, PT, shunt, proximity switch, Typical Transmitter for transducer signals.		
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LIST OF EXPERIMENTS :(ANY TEN)

01. To study various standard sources & measuring units.
02. To measure DC & AC voltages, current using ammeter and voltmeter.
03. To measure resistance, devices like diodes and transistors, voltage and current using analog and digital Multi meter.
04. To measure values of resistance, inductance and capacitance using LCR bridges meter.
05. To use oscilloscope its front panel controls for observing various waveforms.
06. To measure time, voltage, frequency, phase difference of input signals using CRO.
07. To test various types of signal generator (AF, RF, pulse, function, sweep) for its Output Waveform using front panel controls.
08. To observe pattern on the CRO screen and CVS on CRO using pattern generator.
09. To measure unknown resistance using wheat stone bridge
10. To study Schearing bridge
11. To use strain gauges for strain / stress measurement.
12. To use LVDT for displacement measurement.
13. To measure temperature by thermistor and thermocouple.
 - Use of capacitive, resistive, transducers for position, location & displacement Measurement.
 - Introduction to Digital Instrumentation such as Industrial Timer/Counter.

REFERENCES:

Sr. No.	Title of Book	Author and Publication
1	Electronic measurement and Instruments	Cooper (PHI)
2	Electronic & electrical measurments and Instruments	Sawhney (Dhanpatrai)
3	Electronic Instrumentation	Kalsi (TMH)
4	Electronic Instrumentation	S.K.Khedkar (P.V.G.P.)

COURSE CODE:5X203**COURSE NAME: ELECTRICAL TECHNOLOGY (Common for ET, IT, CO)**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	04		02	--	--	06
	Prog.Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03	03			

CONTENTS:

Chapter	Name of Topic	Hrs	Marks
01	Fundamentals 1.1 Structure of atom ,concept of current , emf, pd 1.2 Resistance & its properties 1.3 Laws of resistances & resistivity 1.4 Factors affecting the resistance, Effect of temperature on resistance, RTC 1.5 Ohm's law 1.6 Series & parallel combination of resistances, Division of currents in parallel branches, simple numericals 1.7 Kirchoff's current and voltage law 1.8 Simple numerical based on ohm's law & Kirchoff's laws 1.9 Capacitance, permittivity, series & parallel connections of capacitors, simple numerical.	10	12
02	Magnetism & Electromagnetism 2.1 Concept of magnetic lines of forces, magnetic field. 2.2 Flux, flux density, magnetic field intensity, MMF, reluctance, permeability. 2.3 Magnetic hysteresis, hysteresis loop, hysteresis loss. 2.4 Eddy currents & Eddy current loss. 2.5 Methods to minimize hysteresis & Eddy current loss. 2.6 Electric and magnetic circuit similarities & dissimilarities 2.7 Faraday's laws of electromagnetic induction 2.8 Lenz's law 2.9 Fleming's right hand, Left hand rule, its application. 2.10 Self and mutual inductance, coefficient of coupling	12	12
03	Single phase A.C. Circuits 3.1 Generation of alternating voltage ,wave forms & phasor representation. 3.2 RMS & average values 3.3 Phase & phase difference 3.4 series R-L, R-C, R-L-C circuits, voltage, impedance, power triangle. 3.5 Parallel a.c. circuits. 3.6 Simple numerical based on above topic.	10	12
04	Three phase A.C. Circuits 4.1 Advantages of three phase over single phase, Phase Sequence. 4.2 Star & Delta connections 4.3 Simple numerical based on above topic.	10	12

05	Single phase Transformer 5.1 Construction & classification of single phase transformer based on construction & voltages. 5.2 Working principle, e.m.f. equation, transformation ratio. 5.3 O.C. & S.C test of transformer, efficiency and regulation 5.4 Simple numerical based on above topic.	08	10
06	D.C. Machines 6.1 Construction & classification 6.2 Working principle of d.c. generator & motor 6.3 characteristics of d.c. motor	06	10
07	A.C. Machines 7.1 Construction of three phase induction motor 7.2 Classification 7.3 Speed & Slip 7.4 Construction , Working principle , uses of single phase induction motor 7.5 Universal motor construction, working principle, uses. 7.6 Stepper motor construction, working principle, uses.	08	12

Practical (All compulsory)

- A) Know your laboratory & draw its layout, list the major equipments with their Ratings.
 B) List & understand the safety precaution to be observed while working in laboratory.
 C) Draw the single line diagram of electrical supply system in laboratory.
- Construct a simple circuit using rheostat, ammeter, voltmeter, and wattmeter & verify ohms law.
- Use a rheostat as a regulator and potential divider in the circuit.
- To plot B-H curve of a field winding of a d.c. machine
- To study electrical symbols for drawing for electrical circuits.
- Verification of Kirchoff's laws.
- To calculate p.f. of a R.-L series circuit, and draw phasor diagrams.
- To calculate p.f. of a R.-L -C series circuit, and draw phasor diagrams.
- To complete switch board using indicator, fuse, switches, plug pin socket, regulator.
- To connect a study the connections of fluorescent tube.

Reference Books:

Sr.No	Topic	Author
01	Electrical Technology	B.L. Thereja Vol.-1
02	Electrical Technology	M.K .Chondekar.
03	Electrical Technology	S.L.Uppal

COURSE CODE: 5X204**COURSE: ELECTRONICS DEVICES & CIRCUIT - I**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	04		02	--	--	06
	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To understand basic analog circuit arrangement using various components & devices.

To construct and test analog circuits consisting of discrete components.

RATIONALE:

This course forms foundation for all courses in Electronics. It prepares students to understand construction, operation, characteristics and applications of electronics devices.

OBJECTIVES:

Students should understand basics of different Electronic Devices, Rectifiers and Amplifiers.

CONTENTS:

Chapter	Name of the topic/chapter	hours	marks
1	Types of materials 1.1 Conducting materials: Resistivity, factors affecting resistivity, classifications of conducting materials. 1.2 Insulating materials: Selection of Insulating materials, general electrical properties like, Permittivity, dielectric strength, dielectric loss angle. 1.3 Semiconductor materials: Intrinsic semiconductor, extrinsic semiconductor, P- type, N-type semiconductor. 1.4 Magnetic materials: Classification, properties, soft & hard magnetic materials.	8	10
2	Semiconductor diode 2.1 PN junction, formation of depletion layer in pn junction, barrier Voltage. 2.2 Biasing the pn junction, forward bias, reverse bias, reverse saturation current, VI characteristics, diode current equation, 2.3. Effect of temperature on diode characteristics, static/ dynamic Characteristics of diode. 2.4 Power and current rating of diode. 2.6. Zener diode: Forward/ reverse characteristics, specifications. Equivalent circuit 2.7. Zener diode as regulator, diode specification sheet, simple numerical based on above.	10	10
3	Rectifiers & Filters 3.1. Block Diagram of Power Supply, Half wave, Full wave, Bridge Rectifier. 3.2. Derivation of average value of O/P voltage & load current in HWR, FWR and bridge rectifier. 3.3. Ripple factor, PIV, efficiency, TUF, comparison of rectifiers. 3.4. Filter: concept of filters, types, inductor filter, capacitor filter, bleeder resistance, simple numerical examples based on above.	10	12
4	Introduction to Transistors	10	12

	<p>4.1. Introduction to Transistor construction, transistor terminals identification & symbol, unbiased transistor.</p> <p>4.2. Transistor biasing, operation of NPN/PNP transistor.</p> <p>4.3. CE, CB, CC configuration, relation between alpha & beta, leakage Current in CE/CB configuration.</p> <p>4.4. Transistor I/O characteristics in CE, CB configuration.</p> <p>4.5. Transistor testing, transistor specifications & data sheet, simple Numerical based on above.</p>		
5	<p>Transistor biasing</p> <p>5.1 Introduction, DC operating point, Load line, Q point, Maximum Undistorted output.</p> <p>5.2. Factor affecting stability of Q point, Stability factors, Stability factor of CB, CE Circuit.</p> <p>5.3. Methods of transistor biasing, Base bias, Base bias with emitter feedback, Base bias with collector feedback, voltage divider bias and Stability factor in each, Simple numerical based on above topic.</p>	10	12
6	<p>Field Effect Transistor</p> <p>6.1 Introduction to JFET, Formation of depletion layer in JFET, operation of JFET.</p> <p>6.2. Characteristics, effect of gate to source voltage on drain Characteristics, transfer characteristics, JFET parameters.</p> <p>6.3. Mathematical equation for trans conductance.</p> <p>6.4. Comparison of JFET & BJT.</p> <p>6.5. MOSFET: working of depletion type, enhancement type MOSFET.</p> <p>6.6. Drain & transfer characteristics, simple numerical based on above.</p>	6	12
7	<p>Amplifiers</p> <p>7.1 Important amplifier parameters like Z_o, Z_i, A_v, A_i, h-parameters hybrid equivalent model, determination of h-parameters.</p> <p>7.2. Hybrid equivalent circuit of CE, CB, CC configuration, derivation of current gain, voltage gain, input impedance, o/p impedance, power gain, in CE, CB, CC configuration.</p> <p>7.3 simple numerical examples based on above.</p> <p>7.3. Single stage RC coupled amp, frequency response, calculation of gain, simple numerical examples based on above.</p>	10	12

LIST OF PRACTICALS

1. To plot VI characteristics of Silicon & Germanium diode.
2. To plot characteristics of Zener diode.
3. To study zener diode regulator & plot load /line regulation characteristics.
4. Study of Half wave, Full wave rectifier
5. Study of Bridge rectifier
6. To study Capacitor, LC, π Filter and calculation of ripple factor.
7. To plot the characteristics of transistor in CE configuration.
8. To plot the characteristics of transistor in CB configuration.
9. To plot the characteristics of JFET.
10. To plot the frequency response of single stage CE amplifier
11. To understand the concept of Transistor biasing & stabilization using voltage divider bias.

REFERENCES:

Sr. No.	Title of Book	Author and Publication
1	Electronic Components & Materials	Grover & Jamwal (Dhanpatrai & sons)
2	Applied electronics	R S Sedha (S Chand & Company)
3	Electronics devices & Circuit theory	Robert L Boylestad
4	Electronics Devices & Circuits	David Bell (Prentice Hall)

Course Code: 5X205

Course Name: Digital Electronics

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To construct and test circuits comprising of digital ICs.

RATIONALE:

This course forms the foundation of digital systems which covers enormous range of applications in advance electronic, automation, Automotive, communication & computer Industries. This course will enable students to acquire the knowledge of all basic circuits and systems in the field of digital electronics & use the concept to study & develop various digital circuits.

OBJECTIVES:

This course deals with the basics of digital electronics such as number systems, logic gates, k-map and introduction to combinational & sequential logic design & study concept of memories.

CONTENTS:

Topic no	Contents	Hours	Marks
1	<p>Number Systems & Binary Codes</p> <p>1.1 Introduction to digital Systems.</p> <p>1.2 Number Systems: Binary, Decimal, octal & Hexadecimal, conversion of one number system to other.</p> <p>1.3 Binary addition, subtraction, multiplication & division.</p> <p>1.4 Use of 1's & 2's complements in binary arithmetic.</p> <p>1.5 Binary codes: BCD numbers, weighted & non-weighted binary codes, 8421 BCD code, BCD addition & subtraction.</p> <p>1.6 Excess-3 code & Gray code, BCD addition & subtraction.</p> <p>1.7 Use of 9's & 10's complement in Decimal arithmetic.</p> <p>1.8 Alphanumeric code, ASCII, EBCDIC.</p>	06	12
2	<p>Logic gates & Boolean algebra</p> <p>2.1 Basic logic gates: NOT, AND, OR gate using semiconductor diodes, symbols, truth tables, logic equations.</p> <p>2.2 Fundamental concepts of Boolean algebra: Basic laws, cumulative, AND, OR, complementation, associative, distributive laws, De Morgan's theorems.</p> <p>2.3 Universal logic gates: NOR & NAND gates using diodes, symbols, truth tables, basic logic gates using universal gates, EXOR & EXNOR gates.</p> <p>2.4 Standard form of Boolean function-SOP & POS & its application, K-map reduction method for 2,3 & 4 variables, minimization of</p>	12	16

Dept.coordinator

HOD

Incharge CDC

	<p>logic function specified in min term / max term & truth table, minimization of logic function not specified in min term / max term & truth table.</p> <p>2.5 Design examples : BCD to 7 segment decoder, binary to gray code converter, gray to binary code converter, BCD to excess-3 code converter, excess-3 to BCD code converter.</p>		
3	<p>Arithmetic Elements</p> <p>3.1 Adders: Half & Full adder's n bit serial & parallel binary adder.</p> <p>3.2 Subtractor: Half & full subtractor.</p> <p>3.3 Design 4 bit binary adder/ subtractor using IC 7483, Single digit BCD adder using IC 7483.</p>	04	08
4	<p>Multiplexer & Demultiplexer</p> <p>4.1 Necessity of MUX, Principle of multiplexing & their types- 2 to 1, 4 to 1, 8 to 1, & 16 to 1 lines, Block diagrams Circuit diagrams & operating principles.</p> <p>4.2 Study of IC's – 74150, 74151, 74153 & 74157, Multiplexer tree.</p> <p>4.3 Necessity of DEMUX, Principle of Demultiplexing & their types- 1 to 2, 1 to 4, 1 to 8 & 1 to 16 lines, Block diagram, Circuit diagram Operating principles.</p> <p>4.4 Study of IC's – 74154, 74155, Demultiplexer tree.</p>	06	10
5	<p>Flip Flop</p> <p>5.1 Types of Digital Systems & their block diagram, Operation, Principle Triggering methods: edge & level.</p> <p>5.2 1 bit memory cell, Clocked S-R flips flop Preset & clear.</p> <p>5.3 J-K flip flop, The Race around condition, Master-Slave J-K Flip-flop,.</p> <p>5.4 D type Flip-flop, T type Flip-flop,</p> <p>5.5 Applications of Flip-flops.</p>	06	10
6	<p>Sequential Logic Design</p> <p>6.1 Definition, types: SISO, SIPO, PISO, PIPO, Universal & Bi-directional shift register – Circuit diagram (using D Flip-flop) Working, state diagram.</p> <p>6.2 Binary counter, asynchronous counter, down counter, up counter modulo N counter,</p> <p>6.3 Introduction to synchronous counters, 3-bit synchronous counter.</p>	08	12
7	<p>7. Study of A/D & D/A Converters:</p> <p>7.1 Study of Analog to Digital conversion techniques successive approximation A/D converter – Dual slope A/D conversion, Flash A/D conversion, ICs based on each conversion method.</p> <p>7.2 Study of Digital to Analog conversion Binary weighted resistor method, R-2R, Ladder method, ICs based on D/A conversion technique.</p>	06	12

LIST OF PRACTICALS (ANY FIFTEEN)

1. Study of logic gates, verification by truth-tables.

2. Implementation of Boolean expression using AND/OR/NOT logic and NAND gates.
3. Realization of basic gates using universal gates.
3. Realization of Half and Full adder using gates.
5. Realization of half and full subtractor using gates.
6. Binary adder IC 7483
7. Design and realization of binary to Gray Code converter.
8. Design and realization of gray code to binary Code converter.
9. Design and realization of binary to Excess 3 Code converter.
10. Study of Demultiplexer.
11. Study of Multiplexer.
12. Study of SR-FF, JK-FF, T-FF and D-FF
13. Study of Master-Slave JK Flip-flop.
14. BCD adder using Binary adder.
15. Study of B.C.D. to 7 Segment decoder.
16. Implementation of shift registers
17. Implementation of asynchronous & synchronous counters using J-K flip flops.
18. Implementation of Mod 10 Ripple counter.
19. Study of DAC.
20. Study of ADC.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Modern Digital Electronics	R.P.Jain (TMH)
2	Digital Integrated Electronics	H.Taub and D.Schilling
3	Digital Principles & Application	Albert Paul Malvino & Donald P. Leach Mc-Graw Hill International
4	Digital Logic & Computer Design	Morris Mano, PHI, New Delhi
5	TTL Data Sheets- -, Intersil Data Sheets - - . National Semi-conductor Data Sheets	

COURSE CODE: 5X206

COURSE: CIRCUITS & NETWORK

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03	03			

COMPETENCY STATEMENTS:

- To use mathematics to solve electronics problems
- To develop and interpret passive circuits

RATIONALE:

Electronic Diploma holder deals with various electronics circuits. They have to solve circuit problems and analyze the same. Hence it is essential for electronics diploma holders to study circuits and network.

OBJECTIVES:

Students should understand the importance of circuit for designing, understanding and getting good accuracy from it.

Topic No	Contents	Hours	Marks
1	1. Basic Circuit Elements 1.1 Voltage, Current, Power & Energy, Definitions of Active & Passive elements, Linear & Non linear elements, Lumped and distributed elements 1.2 Circuit elements, branch potential source, current source, Mesh, Node. Resistance, Inductance, Capacitance. 1.3 Energy sources: Voltage source, current source, dependent voltage and current source.	05	09
2	2. Network Analysis 2.1 Kirchoff's Laws: Voltage and current law, 2.2 voltage division, current division circuits, 2.3 Mesh analysis, 2.4 Node analysis, 2.5 Source transformation technique.	08	12
3	3. Network Theorems 3.1 Superposition theorem, 3.2 Thevenin's theorem, 3.3 Norton's theorem, 3.4 Maximum power transfer theorem, 3.5 Millman's theorem, 3.6 Reciprocity theorem, their statement, Explanation and numerical examples.	10	15

	3.7 Star delta transformation, numerical examples based on above. 3.8 Duals & Duality		
4	4. Two port Network 4.1 Definition of two port network, 4.2 Z- parameters, 4.3 Y- parameters, 4.4 ABCD parameters, 4.5 h- parameters, numerical examples based on above.	07	12
5	5. Resonance 5.1 Series resonance-Impedance and phase angle of series resonance circuit, 5.2 voltage and current in series resonant circuit, selectivity and BW in series resonant circuit, 5.3 Q-factor of an Inductor. 5.4 Parallel Resonance- Resonant frequency for tank circuit, 5.5 Q-factor of parallel resonant circuit, numerical examples based on above	06	09
6	6. Filters and Attenuators 6.1 Filters- Classification of filters, decibel & Neper, filter network, 6.2 equations of filter network (T & π), 6.3 Constant K- Low pass & High pass filter, numerical examples based on above. 6.4 Attenuators- T- type & π type attenuators and their design examples, 6.5 Lattice attenuators, Bridge T- attenuators, numerical examples based on above	09	15
7	7. Transients 7.1 Steady state and transient response, 7.2 DC response of RL circuit, 7.3 DC response of RC circuit, numerical examples based on above.	03	08

LAB EXPERIMENTS (ANY TWELVE)

1. To verify KVL and KCL.
2. To Verify Mesh Analysis.
3. To Verify Node Analysis.
4. To verify superposition theorem.
5. To verify Thevenin's theorem.
6. To verify Norton's theorem.
7. To verify Millman's theorem.
8. To verify Reciprocity theorem.
9. To verify Maximum power transfer theorem.
10. To find Z parameters of given two port network.
11. To find Y parameters of given two port network.
12. To find A,B,C,D parameters of given two port network.
13. To find h parameters of given two port network.
14. To plot frequency response of series RLC circuit
15. To plot frequency response of Parallel RLC circuit.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Circuit and Network	A Sudhakar and S P Shyammohan (TMH)
2	Network theory	D. Roy Chaudhary
3	Network analysis	Van Valkinberg

COURSE CODE: 5X207

COURSE NAME: - ELECTRONICS WORKSHOP

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	--		04	--	--	04
	Prog. Test	End Exam				
Marks	--	--	--	50	50	100
Exam Duration	--	--				

COMPETENCY STATEMENT:

To understand method required for developing a Mini-project

RATIONALE:

This course contains all essentials to acquire the knowledge of design, fabrication, assembly and testing of PCBs.

OBJECTIVES:

- To prepare layout and artwork of a PCB
- To fabricate and assemble a PCB.
- To troubleshoot a PCB
- To develop a cabinet
- To know and operate various machines required for PCB fabrication
- To use software like Electronic workbench
- **To Develop Linear or Digital electronics based Mini-Projects.**

Contents

Topic no.	contents	Hours	Marks
1	1. PCB design 1.1 Introduction, Concept of PCB, 1.2 Necessity of PCB, 1.3 Types of materials used for PCB (Copper clad, Glass epoxy).	04	
2	2. PCB fabrication 2.1. Artwork preparation, 2.2 film master preparation, 2.3 Board cleaning, 2.4 Photo printing, Screen printing, Photo resist materials required, Chemicals required, 2.5 Frame making, Ink used for developments, 2.6 Developing the screen printing, Etching, 2.7 Mechanical machining operations, shearing, Sawing, Punching, Drilling.	16	
3	3. Components assembly techniques 3.1 Mounting of the components, 3.2 Types of soldering irons, Components of soldering iron, Types of bits and materials Used.	12	

	<p>3.3 Temperatures controllers for soldering irons, Soldering materials and fluxes used.</p> <p>3.4 Concept of wave soldering.</p> <p>3.5 Cabinet Designing: Mounting of PCB and allied components in the cabinet,</p> <p>3.6 Exposure to standard cabinet available,</p> <p>3.7 Use of catalogs of cabinet. (By using dummy housing practical should be performed)</p>		
4	<p>4. Troubleshooting of electronic circuits</p> <p>4.1 What is troubleshooting? Reading a circuit diagram,</p> <p>4.2 Nature of faults, Fault location, Fault finding aids,</p> <p>4.3 Troubleshooting techniques and procedures,</p> <p>4.4 Grounding systems in electronic equipment,</p> <p>4.5 Systematic troubleshooting checks, Corrective actions,</p> <p>4.6 Preventive maintenance,</p> <p>4.7 Troubleshooting in digital circuits.</p>	16	
5	<p>5. PCB Designing using suitable Software aids.</p> <p>5.1 Preparation of circuit diagram using components from library, inter- connection of components by wires,</p> <p>5.2 To check the electrical design rules and preparation of net list.</p> <p>5.3 To prepare final circuit diagram along with Bill of material.</p> <p>5.4 Preparation of foot print of components which are not present component library.</p> <p>5.5 Back annotation of the components and preparing the complete circuit diagram,</p> <p>5.6 Converting the circuit diagram into a PCB layout and getting the printout of each layer.</p> <p>5.7 Use of dedicated software's like CAD, PROTEL, CADSTAR, EASYTRAX & finally preparing a PCB</p>	16	

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Printed circuit boards	Bosshart
2	Testing & Maintenance	Khandpur

Course code:5X208

Course name: Professional Practices

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	00		02	--	--	02
	Prog. Test	End Exam				
Marks	---	---	--	50	--	50
Exam Duration	---	---	---			

Rationale:

We are aware of the fact that diploma programs tend to produce sound technicians who join various industries local or global. In the era of globalization and global competition the entry in the industrial job sector is being done on the basis of group discussion, campus interview and various personality tests.

Normally qualities like confidence, ability of communicate effectively, attitude, team work are some of the aspects are seen in the candidate along with technical concepts.

This subject will provide opportunity to students to undergo activities enabling them to develop professionally helpful qualities.

Objectives:

The student will be able to

- Collect information from different sources.
- Participate in group discussions
- Present seminars on various topics
- Interact with peers & work in team
- Prepare report on industrial visit

Topic no	Contents	Hours	Marks
01	<p>1. Information search :</p> <p>1.1. Collection of information about electronic tools, Appliances, gadgets, new products Etc.</p> <p>1.2 Market survey for electronic products, telecom products</p> <p>1.3 Market survey for different motors used in electronic Applications.</p> <p>1.4 Study and report on non conventional energy sources.</p> <p>1.5 Environmental hazards due to electronic industry and Remedies.</p> <p>1.6 Use of electronic/telecom in service of agriculture Industry.</p>	08	
02	<p>2. Seminars</p> <p>2.1 Topics related to advance technologies used in electronic & Telecommunication Industry or any relevant topics.</p> <p>2.2 Each student shall prepare & submit a report of at least 10 pages and present a Seminar(10 minutes).</p>	08	

3	3. Expert Lectures by professional/industrial . <ul style="list-style-type: none"> • Cyber security & cyber laws • Advance communication engineering concepts. • Industrial safety procedures & environmental hazards. • Disaster management. • Security systems using electronics • Any other suitable topic. 	08	
4	4.Industrial Visits <ul style="list-style-type: none"> • Industrial visits should be arranged and a report of which should be submitted by each student. <p>Visit to any of the following industry</p> <ul style="list-style-type: none"> • Electronic equipment manufacturing industry. • Resistance welding unit • Industrial automation unit. • Adarsh gram • Service centers for electronic products. • Telephone exchange/mobile units • Any other related industry/manufacturing unit 	08	

COURSE CODE-5G301
COURSE TITLE-ENGLISH

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Particulars	Theory	Practical	Progressive Test	Theory Exam	Term work	Oral	Total
Credits	02	02	20	80	25	--	125

COMPETENCY STATEMENTS:

- To develop Theoretical concepts and practical implementations of English language.
- To develop writing skills.

RATIONALE: English is the only language used all over the world. It is necessary to gain command over English language. English is also developed as a language of International, Trade & Commerce, Library, Link language.

OBJECTIVES: To help students to:

- Become competent in English Grammar and its usage.
- Write and speak English confidently correctly.
- Gain command over English language.
- Learn the modern methods of English such as sending, receiving emails
- To use proper pronunciations competent with International trends.

Sr. No.	Name of Topic	Hours	Marks
1	TEXT FROM BOOK 1.1 Comprehension – Responding to the questions from text (Spectrum) 1.2 Vocabulary - Understanding meaning of new words from text 1.3 Identifying parts of speech from the text.	16	30
2	Situational Grammar 2.1 Tenses and Time 2.2 Yes/No, Wh-questions and Question Tags, Punctuation Marks 2.3 Reported Speech; Voice ;Degree 2.4 Articles ,Prepositions, Conjunction	10	25
3	Craft of Writing 3.1 Paragraph Writing-Definition, Types, Essentials. 3.2 E-mail 3.3 Resume	04	15
4	Functional English 4.1 Vocabulary building- (Synonyms Antonyms, Homophones) Sounds and syllable Sentence structures 4.2 Use of Contextual words in a given paragraph.	02	10

List of Assignments:

1) Building of Vocabulary

Words from the glossary given at the end of each chapter, to be used to make sentences.

2) Applied Grammar

Identify the various parts of speech and insert correct parts of speech in the sentences given by the Teachers.

3) Punctuation

Punctuate 20 sentences given by the teachers.

4) Tenses

List 12 tenses and give two examples for each tense.

5) Dialogue Writing

Write at least two dialogues on different situations.

(Conversation between two friends, conversation between two politicians etc.)

6) Idioms and Phrases

Use of Idioms and Phrases in sentences. (20Examples)

7) Biography

Write a short biography on your favorite role model approximately. (250 – 300) Words with pictures.

TEXT BOOKS”

S.No.	Name of Book	Author	Publication
1.	Spectrum-A Text Book on English	--	MSBTE

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	English grammar and Composition	R.C.JAIN	Macmillan
2.	Dictionary	Oxford	Oxford University
3.	English at Workplace	Mukti Sanyal	Macmillan
4.	A Remedial English Grammar for Foreign Students	P.T.WOOD	Macmillan

COURSE CODE-5G302

COURSE TITLE- COMMUNICATION SKILLS

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Teaching scheme		Evaluation scheme						
TH	01		PT	TEE	TW	PR	OR	TOTAL
PR	02	MAX MARKS	--	--	50	--	25	75
TOTAL	03	DURATION	--	--				

COMPETANCEY STATEMENT:

The student will be able to:

1. To develop Listening, Speaking, Reading and Writing skills.
2. Ability to engage & interact effectively with others.
3. To enable an individual to express perfectly.
4. To use appropriate body language.
5. To obtain acceptance & provide assistance, direction & leadership.

RATIONALE:

Language skills pertaining to English have been already introduced previously. With a view to achieve some command over a language & to develop communication skills is the main objective of this subject.

Topic no	contents	HRS	MARKS
01	Introduction to Communication 1.1 Definition, Importance Communication cycle/process 1.2 The Elements of communication	04	
02	Types of Communication 2.1 Verbal-Nonverbal, Formal – Informal, Upward-Downward, Vertical-Horizontal-Diagonal Communication.	02	
03	Principles of Effective Communication : 3.1 Principles of effective communication 3.2 Communication Barriers & how to overcome them	04	
04	Non Verbal Communication 4.1 Aspects of body language(gestures ,Postures etc.) 4.2 Pictorial Representation(tables,graphs, piechart etc.)	02	
05	Formal Written Skills 5.1 Office Drafting: Circular, notice & memo 5.2 Job Application 5.3 Business Correspondence: Inquiry , order letter & adjustment letter	04	

List of Practicals-

01 Communication Cycle (With the Help of Diagram) + any two communications

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Situations to be represented with the help of Communication Cycle. (Use Pictures)

02 Speeches

03 conversations

04 Group discussions

05 Non-verbals Communication:

Body Language: Five Illustrations of appropriate use of Body Language used on the part of student in formal and Informal setups. (Example- formal setup- classroom)

Seminar related on any topic.

07 Interview Techniques

08 Job Applications & Effective Resume Writing

REFERENCE BOOKS:

S.No.	Name of Book	Author	Publication
1.	Text book of Communication skills	MSBTE	MSBTE
2.	Everyones guide to Effective Writing	Jayakaran	Apple
3	Developing Communication Skills	Krushnan Mohan,Meera Banarji	Macmillan
4	Professional Communication Skills	Pravi S R Bhatia	s. chand&co.

Course Code: 5G303

Course Name: ENTREPRENEURSHIP DEVELOPMENT

Teaching Scheme	Evaluation Scheme
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TH	01		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks			25	--	25	50
TOTAL	03	Duration			--	--	--	--

RATIONALE:

The post liberalization industrial and economic scenario in India makes it imperative that a more dynamic and pragmatic approach be adopted to create new, first generation entrepreneurs on a large scale.

This would help in tackling the problem of unemployment and contribute to the creation of new entrepreneurs. Using knowledge & advanced technology as their strategic tools those who can take on the increased competition in the domestic as well as global markets are innovators and entrepreneurs in true sense. This can be achieved only if more and more people are motivated and convinced to choose entrepreneurship as a career and put their energies and resources to a productive use.

The student community also needs to explore the emerging opportunities. It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for white-collar jobs. This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

Objectives:

Students will be able to

- Appreciate the importance of entrepreneurship.
- Identify entrepreneurship opportunity.
- Get primary information to start any business.
- Acquire entrepreneurial values and attitude.
- Use the information to prepare project report for business venture.
- Develop awareness about enterprise management.

Course Contents:

Topic No	Name of Topic	Hours	Marks
01	Basic Concepts 1.1. Concept, Classification & Characteristics of Entrepreneur. Creativity and Risk taking, Concept of Creativity & Qualities of Creative person. Risk Situation, Types of risk & risk takers. 1.2 Business Idea Methods and techniques to generate business idea 1.3 Transforming Ideas in to opportunities transformation involves Assessment of idea & Feasibility of opportunity, SWOT Analysis.	2	
02	Information And Support Systems 2.1 Information Needed and Their Sources. Information related to project, Information related to support system, Information related to Procedures and formalities.. 2.2 Support Systems: <ul style="list-style-type: none"> • Small Scale Business Planning, Requirements. 	3	

	<ul style="list-style-type: none"> • Govt. & Institutional Agencies, Formalities • Statutory Requirements and Agencies. • Government Support and subsidies to entrepreneur. 		
3	Market Assessment 3.1 Marketing -Concept and Importance 3.2 Market Identification, Survey Key components (Market Segmentation) 3.3 Market Assessment.	2	
4	Business Finance & Accounts 4.1 Business Finance <ul style="list-style-type: none"> • Cost of Project • Sources of Finance • Assessment of working capital • Product costing • Profitability • Break Even Analysis • Financial Ratios and Significance 4.2 Business Account Accounting Principles, Methodology <ul style="list-style-type: none"> • Book Keeping • Financial Statements • Concept of Audit, • Trial Balance • Balance Sheet 	4	
5	Business Plan & Project Report 5.1 Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2 Project Report <ol style="list-style-type: none"> 1) Meaning and Importance 2) Components of project report/profile (Give list) 5.3 Project Appraisal <ol style="list-style-type: none"> 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis 	2	
6	Enterprise Management And Modern Trends 6.1 Enterprise Management: - <ol style="list-style-type: none"> 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance, Importance of Quality, Importance of testing 5) Industrial zones and SEZ. 6.2 E-Commerce , Concept and process 6.3 Global Entrepreneur: role and opportunities.	3	

Practical:

The practical task may be divided in following heads

1. Literature survey – MSFC/IDBI/MSSIDC/CIDBI/MSME/DIC/ ROLE OF DIFFERENT COMMERCIAL BANKS etc.

2. Administration of ready made tools like questionnaires, opinionnaire, Interview schedule for product identification purpose (decision making process).
3. Development of “Business Ideas”.
4. Visit to MCED/MITCON- going through the product related library.
5. Preparation of Preliminary / Detailed project report in the formats recommended by MCED/MITCON.
6. At least one case study of successful entrepreneur..

Text Books

Sr. No	Title of Book	Author and Publication
1	Entrepreneurship Development	TTTI, Bhopal.
2	The Seven Business Crisis& How to Beat them	V.G.Patel
3	A handbook of New Entrepreneurs	P.C.Jain ,Dhanpat Rai and Sons
4	Entrepreneurship development	E.Gorden, K. Natrajan.
5	New Initiatives in Entrepreneurship Education And training	Gautam Jain, Debmuni Gupta
6	www.ediindia.org .	
7	Entrepreneurship Theory and Practice	J.S.Saini,B.S.Rathore
8	Entrepreneurship Development and management	A.K.Singh, Laxmi Publications
9	The Beermat Entrepreneur	Southon, Pearson Education limited

Course Code:5X301

Course Name: C PROGRAMMING

Teaching Scheme		Evaluation Scheme						
TH	02		PT	TH	TW	PR	OR	Total
PR	04	Max. Marks	20	80	25	25	--	150

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TOTAL	06	Duration	01	03	--	--	--	--
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RATIONALE:

In advanced age of computer, it becomes essential to understand how to give instructions to computers. This course intends to expose a student to the basic principles of programming through a structured programming language like 'C'. Study of this course would enable the students to learn any advanced Object Oriented Language or use the concepts of C in advanced environments used for electronic design & application software's such as embedded C etc.

COMPETENCY STATEMENTS:

1. To use and work in a programming environment.
2. To enhance logical thinking.
3. To develop 'C' programs for simple applications.
4. To interpret 'C' programs
5. To solve problems using 'C'.
6. Implementing 'C' functions.

COURSE CONTENTS:

Topic No.	Content	Hours	Mar
1.	1 Steps in program development 1.1 Programming process, 1.2 Algorithm 1.3 Flowcharting & different symbols Study of 'C' as a programming language 1.4History of 'C' 1.5 Introduction to 'C' 1.6. Basic structure 'C' program, sample 'c' program 1.7 Execution of 'C' program Constant variables and data types 1.8.Character set 1.9.Key words and identifiers 1.10Constants 1.11Data types 1.12Variables and declaration of variables	03	08
2.	Operators and Expressions 2.1Arithmetic, relational, logical operators 2.2Assignment, increment and decrement operators 2.3Conditional and special operators 2.4Bit wise operators 2.5Arithmetic expressions 2.6Evaluation of expressions 2.7Type conversion in expressions	03	15
3.	3.Managing input and output operator 3.1. Reading a character 3.2. Writing a character 3.3. Formatted input 3.4. Formatted output	02	12
4.	4.Decision making, branching and looping 4.1Decision making with IF statement	06	15

	4.2 Simple IF statement, 4.3 IFELSE statement, 4.4 Nesting of IF ELSE statement 4.5 Else IF ladder 4.6 SWITCH statement 4.7 GOTO statement 4.8 WHILE statement 4.9 DO statement 4.10 FOR statement		
5.	5 Functions 5.1 User defined functions, 5.2 A multifunction program, 5.3 The form of 'C' function 5.4 Return value and their types 5.5 Calling a function 5.6 Category of functions 5.7 No arguments and no return value 5.8 Arguments with return value 5.9 Nesting of functions and recursion	06	10
6.	Arrays 6.1 One, two, multidimensional arrays	06	10
7.	7. Strings 7.1 Declaring and initializing strings 7.2 Reading string from a terminal 7.3 Writing strings to screen 7.4 Comparison of two strings 7.5 String handling functions 7.6 Table of strings	06	10

TERM WORK:

1. Demonstration of Turbo C compiler, creating a program, compiling and linking, executing programs.
2. Programs based on declaring variables and assigning values to variables.
3. Preparing at least 5 Programs based on expressions and operators.
4. Programs using printf(), scanf(), getch(). Putch().
5. Programs using control statements such as IF Statement, SWITCH statement, GOTO statement.
6. Programs using loop controls such as WHILE loop, DO WHILE loop, FOR loop.
7. Programs using functions.
8. Programs using arrays.
9. Programs using string operations such as comparison, concatenation, copying counting, and append.

TEXT BOOK:

Sr.No	Title and Edition	Author	Publisher
1.	Let us 'C'	Yashwant Kanitkar	BPB publications
2.	Programming in 'C'	Balguruswamy	Tata Mc- Graw Hill
3	'C' for engineers	Prakash khanale, Madhuri Joshi	-
4.	Introduction to 'C' programming	Denis Ritchie and Kerninghan	Prantice Hall Publications
5.	Introduction to 'C' programming	Byron Gotfried	Tata McGraw Hill

Course code: 5G304

Course name: Environmental science

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	02		--	--	--	02
	Prog. Test	End Exam				
Marks	--	--	---	50	--	50
Exam Duration	--	--	----			

Rationale:

The course of environmental science /studies aims at providing the knowledge and social awareness of various s and the pollutants, wastes, effects, preliminary treatments with recycling aspects for the benefit of mankind.

Objectives:

Students should be able to

- Understand the nature & environment
- Create awareness in environmental science
- Know various resources
- Bifurcate different types of industrial wastes

- Understand the concept of pollution and its effect on environment
- Create the awareness of norms and standards for disposal of wastes.
- Utilize the recycled waste for the benefit of mankind

Contents

Topic no	contents	Hours	marks
1	PART A 1. Resources: 1.1 Engineering use of natural and artificial resources such as water, metal, wood, plastic, rubber and Glass 1.2 List various type of resources.	02	
2	2. Environment 2.1 Meaning of environment, scientific aspects, burning topics on environment science such as global warming, Climate change, deforestation. aquatic life and Tsunami effects etc. 2.2 Activity web searching of burning topic on Environmental hazard, poster Competition/exhibition/slogan etc.	04	
3	3.Wastes 3.1 Different types of wastes, causes and effects of wastes on plants, animals and human life. 3.2 Listing causes and effect and risks of any one waste.	04	
4	4.Pollution 4.1 Meaning of pollution and its types (air, water, sound) causes and its effects. 4.2 Pollution norms, rules and bye laws 4.3 Group discussion and conclusion.	06	
5	PART B E-waste 5.1 Definition, Hazardous waste, 5.2 Effects of materials used in electronic gadgets and appliances, 5.3 materials used for cell phones, batteries on environment, 5.4 Risks due to e toxic, recycling and disposals 5.5 Market survey of any one type of Waste 5.6. Recycling idea of the waste.	07	
6	6. Waste from electronic industries 6.1 Waste water treatment, 6.2 Sludge solids, 6.3 Pollution due to air, rejected components, soldering and manufacturing process. 6.4 Standards of pollution control board/industry for its disposal.	05	
7	7. Environmental Management 7.1 Meaning of environmental Management. 7.2 Management of any one type of waste. 7.3 Expert lecture on a) Duties of citizen and role of government b) Environmental management Assesment.	04	

Course Code:5G305
Course Name: Industrial Management (INM)

Teaching Scheme		Evaluation Scheme						
TH	03		PT	TEE	TW	PR	OR	Total
PR	02	Max.Marks	20	80	25	--	25	150
TOTAL	05	Duration			--	--	--	--

Rationale:

The diploma pass out is placed in middle management cadre in the industrial organizational set up. A proper insight and understanding of Business Processes is therefore essential for all diploma holders. Management is a subject which deals with basics of Managerial science required to understand the processes in Industrial & Commercial environment. This will enable the student to become familiar and to understand various Business processes, structures, their functioning and the role technicians in industries.

Objective:

After completion of the curricula, the pass outs will able to:

1. Familiarize environment in the world of work
2. Appreciate the importance of management process in Business.
3. Identify various components of management.
4. Understand the role & responsibilities of a Technician in an Organization.
5. Appreciate the rules and regulations pertaining to work ethics and Social

Responsibilities.

Content:

Topic No	Name of Topic	Hours	Marks
01	Overview Of Business 1.1. Types of Business <ul style="list-style-type: none"> • Service • Manufacturing • Trade 1.2 Globalization <ul style="list-style-type: none"> • Introduction 1.3 Intellectual Property Rights (I.P.R.) Advantages & disadvantages with respect to India	(03) 01 01 01	6
02	Evolution of Scientific Management 2.1 Evolution of Management Concept and definition of management Levels of management Administration & management Scientific management by F.W.Taylor Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management <ul style="list-style-type: none"> • Planning • Organizing • Directing • Controlling 2.4 Organizational Management Introduction to Organization, Types of organization: Line, Line & staff, Functional Project <ul style="list-style-type: none"> • Centralized & Decentralized, Authority & responsibility Span of Control 2.4 Forms of ownership <ul style="list-style-type: none"> • Proprietorship, Partnership, Joint stock, Co-operative Society, Govt. Sector 	(07) 01 01 01 01 02 02	10
3	Human Resource Management 3.1 Personnel Management: Definition and Functions 3.2 Staffing <ul style="list-style-type: none"> • Introduction to HR Planning • Recruitment Procedure 3.3 Personnel Training & Development Types of training Skill Enhancement 3.4 Leadership & Motivation Maslow's Theory of Motivation Front Line Supervisor Group Dynamics. 3.5 Safety Management <ul style="list-style-type: none"> • Causes of accident • Safety precautions, Industrial hygiene 3.6 Introduction to Factory Acts	(09) 01 01 02 02 02	15

	<ul style="list-style-type: none"> • ESI Act • Workmen Compensation Act • Industrial Dispute Act. (Introductory approach only)	01	
4	Financial Management Objectives & Functions, 4.2. Capital Generation & Management <ul style="list-style-type: none"> • Types of Capitals • Sources of raising Capital 4.3 Budgets and accounts Types of Budgets Production Budget (including Variance Report) Labour Budget Introduction to Profit & Loss Account (only concepts) ; 4.4 Introduction to <ul style="list-style-type: none"> • Excise Tax • Service Tax • Income Tax • MOD-VAT • Custom Duty (Introductory approach only)	(09) 01 03 03 02	12
5	Materials Management 5.1 Inventory Management -Meaning & Objectives. ABC Analysis Economic Order Quantity, Introduction & Graphical Representation. 5.2 Purchase Procedure, Objects of Purchasing, Steps in Purchasing 5.4 Modern Techniques of Material Management <ul style="list-style-type: none"> • Introductory treatment to JIT / SAP / ERP. (Introductory approach only)	(06) 03 02 01	10
6	Marketing Management Introduction The Market, types of market, marketing process Selling vs. marketing, stress on customer centric approach. Marketing Segmentation: benefits, marketing information system, Objectives of Marketing research, Primary and Secondary data, Survey method, Uses of survey method, Types of survey, observation approach, panel research, experimental research, scope for marketing research in India. Sales Promotion only concept, importance of advertisement in marketing, Media selection, channels of distribution, Emergence of global marketing, international marketing environment, Multinational companies, procedure of export. (Introductory approach only)	(08) 01 02 02 02 01	12
7	Project Management 7.1 Project Management: Introduction ,CPM & PERT Technique Concept of Break Even Analysis (only introductory), Progress tracking with the help of bar charts. 7.2 Quality Management Definition and concept of Quality , concept of Quality , Quality Circle, Quality Assurance, TQM, Kaizen, 5 'S',	(06) 03 03	15

	& 6 Sigma. (only introductory). (Introductory approach only)		
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List of Practical:

The practical in management may consist of following task,

- Case studies.
- Guided Presentation.
- Management Games.
- Surveys.
- Data collection, Presentation and Interpretation.
- Role play/Group Discussions.
- Case Study :
- The case study approach may be applied to following subtopics of the curriculum.
- The concern teacher may select similar suitable topics for case study.
- (Any Two case studies and its presentation)
- Types of Business
- Intellectual Property Rights (I.P.R.)
- Forms of ownership
- Training & Development
- Leadership & Motivation
- Group Dynamics
- Industrial hygiene
- Sources of raising Capital
- Budgets and accounts
- MOD-VAT
- Modern Techniques of Material Management
- Marketing Segmentation
- Sales Promotion
- Quality Management
- Guided Presentation (Any two)
- Centralized & Decentralized, Authority & responsibility
 - Span of Control
- Skill Enhancement
- Safety Management
- Budgets
- JIT / SAP / ERP
- Advertisement in marketing,
- Media selection
- Global marketing
- Quality Management.
- Progress tracking
- Management Games (Any two games from following areas or like wise)
- Human Resource Management
- Marketing Management
- Materials Management
- Project Management
- Lateral Thinking
- Surveys (Any one survey form following areas or like wise)
 - Training & Development
 - Causes of accident
 - Industrial Dispute
 - Sources of raising Capital
 - Inventory Management

- Customer centric approach by various business houses.
- Sales Promotion
- Product Mix
- Media selection
- Role of Multinational companies
- Impact of Quality Management parameters on project.
- Data collection, Presentation and Interpretation
- (Any one form following areas or like wise)
- Training & Development
- Capital Generation & Management
- Inventory Management
- Sales Promotion
- Media selection
- International marketing environment
- Channels of distribution
- Project Management
- Quality Management Parameters.

COURSE CODE: (5X401)
COURSE NAME: Signals & Systems

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

Rationale:

Signal & Systems is a very important subject as these days practically signal analysis has been gained importance in Digital Signal Processing (DSP). In future Student may be able to identify the practical applications in analysis of speech signals, its processing & Compression. Signal processing also find its applications in the field of telephony, Radar and space communication. It is also useful in the field of medical Electronics.

OBJECTIVES:

After completion of this subject the students will be able to learn

1. Continuous time & discrete time LTI Systems
2. Significance of LTI Systems and its analysis.
3. Fourier series representation of different signals and its applications
4. Use of Laplace transform in analysis of LTI systems
5. Find Fourier analysis of discrete time signals.

Contents

Topic no	contents	hours	marks
01	Introduction to signals & Systems 1.1- Discrete and continuous signals- Transformation of signals, the need and requirements - Standard test signals:- unit step and unit impulse in both domain.- Periodicity concepts. 1.2 Introduction and overview of a system- Properties of system like Memory, Invertibility, Causality, Stability, Time invariance, Linearity	06	10
02	2. Linear time invariant system (LTI) 2.1 Introduction & Importance of LTI system 2.2. Signals in terms of impulse of signals 2.3 Convolution sum of LTI discrete systems 2.4. Convolution integral of LTI continuous systems 2.5. Properties of LTI system 2.6. Unit step response of LTI system 2.7. Representation of LTI system using differential and difference Equations 2.8. Block diagram representation of systems.	10	16
03	3. Fourier Transform 3.1 Introduction of Fourier series & Fourier Transform 3.2. Complex sinusoidal and LTI system	08	12

	3.3. Fourier series representation of Periodic signals 3.4. Properties of Fourier transform. 3.5. Convergence of Fourier transforms. 3.6. Inverse Fourier transforms (only introductory treatment)		
04	4. Discrete Fourier Transform 4.1. Definition of DFT (Discrete Fourier Transform) 4.2. Twiddle factor 4.3. Properties of DTFT 4.4. IDFT (Inverse Discrete Fourier Transform) 4.5. DFT Frequency Response Characteristic 4.6. Relationship of DFT to other Transform	08	12
05	5. Laplace Transform (H-08 M-12) 5.1 Introduction and need. 5.2 Definition Unilateral & Bilateral Laplace transform. 5.3 Properties of Laplace Transform, 5.4 The inverse Laplace transforms.	08	12
06	6. The Z Transform 6.1 Basic principles of Z Transform, Definition 6.2 Region of convergence for Z transforms properties of ROC. 6.3 Properties of Z Transform. 6.4 Relationship between z Transform & Fourier Transform. 6.5 Poles & Zeros. 6.6 Inverse Z Transform	08	18

Practical/Tutorials:-

Perform following any ten experiments with the help of any computational Software like MATLAB etc.

1. Introduction to MATLAB environment.
2. Generation of signal using MATLAB.
3. Generation of Waveform using MATLAB
4. To study continuous time signal and discrete time signal.
5. To study convolution sum of two sequences.
6. Verification of Discrete Fourier Transform.
7. Verification of Z -Transform.
8. To study signal processing operations on signals.
9. Study various types of systems in DT domains on the basis of linearity / non Linearity, time invariance, memory, stability, causality etc.
10. A) Analysis of typical signals using Laplace transforms
B) Solution of typical differential equations using Laplace transform (with initial Conditions)

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Signals And Systems	Haykin Simon & Veen Barry Van John Wiley & Sons, Inc, 1999
2	Signals And Systems.	Oppenheim Alan V, Willsky Alan S & Nawab Hamid New Delhi. Prentice Hall Of India, 2004
3	Signals and Systems	Gable and Roberts , Wiley Publications
4	Signals and Systems	Smarajit Ghosh, Pearson Education

COURSE CODE: 5X402

COURSE NAME: LINEAR INTEGRATED CIRCUITS

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

Construct and test circuits comprising of analog ICs.

RATIONALE:

This course deals with commonly used linear IC's like operational amplifier, PLL, waveform generator, voltage regulator. This subject acquaints students with general analog principles and design methodologies using practical devices & application.

OBJECTIVES:

- To familiarize with various linear IC's and circuits.
- To Design & analyze linear circuits.

CONTENTS:

Chapter no	contents	hours	marks
01	<p>OPERATIONAL AMPLIFIERS</p> <p>1.1 Electrical properties, transfer characteristics and parameter of ideal OP AMP,</p> <p>1.2 Block diagrams and operating principle of each block of OP AMP.</p> <p>1.3. Definition of OP AMP parameters, symbol, pin diagram, ratings of IC 741,</p> <p>1.4. Equivalent circuit of OP AMP. Open-loop OP-AMP Configurations, instability in open-loop configuration</p> <p>1.5 OP-AMP with negative feedback.</p>	06	12
02	<p>OP AMP BASIC CIRCUITS</p> <p>2.1 Virtual ground concept</p> <p>2.2 Open loop configuration – Inverting , Non inverting</p> <p>2.3 Close loop configuration – Inverting, non- inverting, differential amplifier, unity gain amplifier (voltage follower), inverter (sign changer)</p> <p>2.4 Inverting & non-inverting configuration of Adders (summing amplifier, scaling Amplifier, averaging amplifier)</p> <p>2.5 Subtractor</p> <p>2.6 Practical Integrator & Practical Differentiator.</p> <p>2.8 Numerical's based on designing of above circuit.</p>	07	12
03	<p>SPECIAL OP AMP CIRCUITS</p> <p>3.1 Bridge amplifier, instrumentation amplifier with two and</p>	06	12

	<p>three OP AMPS.</p> <p>3.2. V-I converters, I-V converters, logarithmic & Antilogarithmic amplifier.</p> <p>3.3 Astable, Monostable and Bistable Multivibrator using OP AMP.</p>		
04	<p>VOLTAGE REGULATORS</p> <p>4.1. Linear voltage regulator: Block schematic, pin diagrams, features, Specifications, rating and operating principle of IC 723,78xx,79xx series.</p> <p>4.2. Block schematic, pin diagram, features, specifications, ratings and operating</p> <p>4.3 Principle of switching regulator IC LM 317, LM337 Regulator.</p>	07	12
05	<p>COMPARATORS AND TIMERS</p> <p>5.1. Op-Amp as comparator, Study of Op-amp peak to peak detector, phase detector circuit, voltage level detector circuit.</p> <p>5.2. Schmitt trigger using op-amp.</p> <p>5.3. Study of timer IC – 555, Block diagram, Operating principle, pin diagram, Features of IC-555 ,</p> <p>5.4. IC-555 as Astable, Monostable, bi-stable and Schmitt Trigger. Sample and hold circuit.</p> <p>5.5 Phase Locked Loop- Principle & block diagram of PLL, Transfer characteristics, lock range & capture range.</p> <p>5.6 Special purpose IC's :- IC 565 (phase lock loop), IC 566 (voltage controlled oscillator) , its block diagram and pin diagram, application of PLL.</p>	14	18
6	<p>ACTIVE FILTERS AND OSCILLATORS</p> <p>6.1 Introduction To Filters ,Classification Of Filters ,Merits & Demerits Of Active Filters Over Passive Filters.</p> <p>6.2 First order low pass & high pass Butterworth filter design.</p> <p>6.3 Band pass & Band reject filter design.</p> <p>6.4 Oscillators- Principle, types, frequency stability.</p> <p>6.5 Phase shift oscillator, wienbridge oscillator, Quadrature oscillator</p>	08	14

LIST OF EXPERIMENTS (ANY TEN)

1. To measure op-amp parameters and compare with typical values of IC- 741.
2. To plot frequency response of IC-741 in inverting and non-inverting mode.

3. To study unity gain amplifier using OPAMP and plot its transfer characteristics.
4. To verify the operation of OPAMP adder.
5. To verify the operation of OPAMP subtractor.
6. To verify the operation of Op-amp Integrator.
7. To verify the operation of Op-amp differentiator.
8. To calculate gain and frequency response of instrumentation amplifier.
9. To study OPAMP as comparator.
10. Observe and plot waveforms of astable multivibrator and calculate its frequency.
11. Observe and plot waveforms of monostable multivibrator and calculate its frequency.
12. To observe and plot waveforms of Schmitt trigger.
13. To plot load regulation characteristics of voltage regulator using IC-723.
14. To observe and plot waveforms of monostable multivibrator using IC- 555.
15. To verify the operation of phase shift oscillator using op-amp.
- 16.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Operational Amplifier	Gaikwad
2	Integrated Circuits	Botkar
3	Operational Amplifier	Graeme and tobey
4.	Operational Amplifier	Clayton

COURSE CODE: (5X403)**COURSE NAME: - PRINCIPLES OF COMMUNICATION ENGINEERING (PCE)**

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	04	02	--	--	06

	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To understand basic concepts required for developing analog communication systems.

RATIONALE:

This course contains all the important features of analog communication, different methods of modulation, demodulation, Transmitter and receiver circuits which are essential for electronics & telecommunication diploma holders so that he can easily understand concepts & Technologies used in advanced communication areas.

OBJECTIVES:

- To understand principle of modulation
- To understand principle of demodulation
- To understand various types of modulation and demodulation systems and compare them
- To understand the principle of antennas and transmission lines
- To identify the different sections of radio receiver.
- To be able align and find faults in radio receiver systems

CONTENTS

Chapter no	Topics/subtopics	Hours	Marks
01	<p>Introduction to communication</p> <p>1.1 Types of electronic communication, Wired & wireless communication, Simplex- Duplex</p> <p>1.2 Need of modulation, modulation – Definition, Classification, Bandwidth Requirement, Classification of Frequency bands (Electromagnetic spectrum).</p> <p>1.3 Basic communication system – block diagram, Channels, Noise sources in Communication systems.</p>	06	09
02	<p>Amplitude modulation and demodulation</p> <p>2.1 Definition, Mathematical analysis of AM, Voltage & current relationship in AM, Power relationship in AM, Modulation index, Simple Numerical's. Disadvantages of AM.</p> <p>2.2 Definition of DSB-SC, SSB-SC, VSB, Pilot carrier side band technique, ISB. High-level modulation, Low level modulation, AM generation circuit: Plate modulated class C amplifier, Grid modulation circuit, Collector Modulation.</p> <p>2.3 Functions of receiver, Block diagram of TRF radio receiver, AM super heterodyne radio receiver,</p> <p>2.4 Characteristic of Radio receiver –Sensitivity, Selectivity, Fidelity</p> <p>2.5 AM detector circuit, Distortions, Use of AGC circuit, Delayed AGC, Mute circuit, Block diagram of double Conversion receiver.</p>	15	16

3	SSB / ISB Transmission and reception 3.1 Generation of SSB, Balanced modulator circuit, 3.2 Methods of SSB generation, Filter method, Phase shift method, Third method, SSB transmitter, VSB technique. 3.3 SSB receiver block diagram, Pilot carrier SSB receiver, ISB receiver	06	08
4	4 Frequency modulation and demodulation 4.1 Definition, Mathematical analysis of FM, Narrow band FM, Wide band FM, 4.2 Maximum frequency deviation, Deviation ratio, Bandwidth requirement, 4.3 Advantages & disadvantages of FM over AM based on BW & noise. 4.4 FM transmitter block diagram, Methods of FM Generation- Reactance modulator (Transistorized circuit), and Varactor diode modulator. 4.5 Concept of pre-emphasis and De-emphasis 4.7 Block diagram of FM transmitter (Armstrong Frequency modulation system) 4.8 Block diagram of FM radio receiver, comparison of FM with AM receiver. 4.9 Demodulation of FM, Foster Seeley discriminator, Ratio Detector, Use of AFC and its block diagram.	15	18
5	5 Antenna 5.1 Basic concept of transmitting and receiving antenna, 5.2 Antenna parameters-Antenna gain, Directivity, Radiation pattern, Polarization, Bandwidth, Beam width etc. 5.3 Dipole antenna-Half wave dipole-Folded dipole Antenna –Their radiation patterns. 5.4 Structure ,Radiation pattern, and application of : loop antenna-Ferrite rod antenna-Telescopic antenna, Design of Yagi-uda antenna for VHF band (I & III), 5.5 Microwave antenna-Dish antenna-Horn antenna-Feed Mechanism.	08	10
6	6 Transmission lines 6.1 Fundamentals of transmission lines, Equivalent circuit of transmission line 6.2 Definition of Characteristics impedance- method of Calculation-simple numerical's. 6.3 Losses in transmission line. 6.4 SWR, VSWR, Reflection coefficient-simple numericals. 6.5 Quarter and half wavelength lines 6.6 Impedance matching –single and double stub 6.7 Baluns	08	10
7	7 Wave Propagation 7.1 Fundamentals of electromagnetic Wave –TEM wave- Polarization 7.2 Ground wave-Ionosphere-Sky wave propagation 7.3 Concept of actual height and Virtual height 7.4 Definition –Critical frequency-MUF-Skip distance-Fading	06	09

	7.5 Space wave propagation 7.6 Duct propagation 7.7 Troposphere scatter propagation		
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LIST OF EXPERIMENTS (ANY TEN)

1. Determination of modulation index of AM wave
2. Demodulation of AM
3. Observation and study of FM wave
4. Study of FM transmitter block diagram
5. Study of block diagram of AM superhetrodyne radio receiver
6. Study of FM radio receiver
7. Study of demodulation of FM
8. Fault finding of AM radio receiver
9. Fault finding of FM radio receiver
10. Visit report of AM /FM transmitting station
11. Study of transmission line parameters.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Electronics Communication systems	George Kennedy (TMH)
2	Electronics Communications	Roody Coolen (PHI)
3	Principles of communication Engg.	Anokh Singh (S Chand)
4	Principles of communication	Taub & Schilling (TMH)
5	Introduction to analog and digital communication	Simon Haykin(John Wiely Sons)
6	Communication Systems	B .P Lathi (BS publication)

COURSE CODE: 5X404

COURSE NAME: MICROPROCESSORS (MPU)

Particulars	Theory	Practical	T.W.	Oral	Total
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Dept.coordinator

HOD

Incharge CDC

Credits	04		02	--	--	06
	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To understand Microprocessor based systems and write Assembly language programs for various applications.

RATIONALE:

Now a days Microprocessors are used in almost every area for controlling various parameters in industries. Hence it is essential for the Electronics Diploma holder to know the basics of the microprocessor & assembly language programming.

OBJECTIVES:

This course contains Architecture of 8085 microprocessor, its programming, interfacing and few applications based on it.

It also includes Programmable peripheral Devices used in microcontroller applications.

CONTENTS:

Chapter no	Topics/subtopics	Hours	Marks
1	1. Introduction to Microprocessor 1.1 Organization of Microprocessor Based System, Memory, Input, Output. 1.2 Terminology used in microprocessors & Microprocessor Based Systems. 1.3 Features of 8-bit microprocessors such as 8085, 6800 & Z-80.	02	06
2	Microprocessor Architecture 2.1 Architecture of 8085 microprocessor, Functional Block Diagram of 8085 2.2 Functional Pin diagram of 8085 2.3 Generation of control signals and demultiplexing of address/data bus, Clock Circuit, reset circuit	06	09
3	3. 8085 Instruction Set and Programming 3.1 Instruction Classification, Instruction format, 1,2,3 byte instructions 3.2. Addressing modes, Data transfer, Arithmetic, Logical, Branch, I/O & machine control Instructions. 3.3 Simple programs.	12	09
4	4. Instruction Timing Diagram 4.1 Instruction cycle, Machine cycle & T- State. 8085 Machine cycle and their Timings, Wait state generator. 4.2. Timing diagram for 8085 instructions	06	06
5	5 Stack & Subroutines	06	06

	5.1 Use of stack by programmer, stack related instructions, 5.2 Introduction of Subroutines, CALL and RET Instructions, Nested and Multiple ending Subroutines. 5.3 Delay Subroutines using registers, program based on subroutines		
6	6. 8085 Interrupts 6.1 Types of Interrupts interrupt structure, vectored interrupts & their priorities, RST 6.2 Instructions, EI , DI, RIM & SIM instructions.	04	06
7	7. Memory & I/O interfacing 7.1 Basic concepts of memory & I/O interfacing. 7.2 Absolute decoding and linear decoding, Wait State Generator 7.3 I/O mapped I/O & Memory mapped I/O 7.4 Interfacing of RAM, ROM, and EPROM to 8085.	06	09
8	8. Programmable Peripheral Interface 8255 8.1 Features of 8255, Block diagram of 8255, 8.2. Control word, I/O mode, BSR mode, 8.3 Operation modes of 8255. 8.4 Interfacing 8255 in I/O Mapped I/O & Memory Mapped I/O.	10	14
9	9. Programmable Peripheral Devices. 9.1 PIT 8253,Block Diagram, Control Word, Modes of Operation.(Introductory approach) 9.2 USART 8251, Block Diagram, Control word, Status Word. .(Introductory approach) 9.3 8279 Block Diagram, Command Words, Operating Modes. (Introductory approach)	12	15

LIST OF PRACTICALS

1. Introduction to Microprocessor kit, instruction manual and writing simple assembly language programs.
2. To Write & Execute 8-bit & 16-bit Addition & Subtraction programs.

3. To Write & Execute Decimal addition & Subtraction programs.
4. To Write & Execute Block transfer program.
5. To Write & Execute Multiplication & Division programs.
6. To Write & Execute program to find Largest Number in given series.
7. To Write & Execute the program to arrange the given numbers in Ascending & descending order programs.
8. To Write & Execute the program to identify EVEN/ODD numbers.
9. To Write & Execute the program for Counting Of 0's & 1's in a byte.
10. To write & execute Code Conversion programs.
11. To Write & Execute programs involving interfacing of 8205.
- 12 Applications Programs with Interfacing Diagram of the following using 8085
 - i. Traffic Light Controller,
 - ii. Temperature Controller,
 - iii. Stepper motor driver interface,
 - iv. Rolling LEDs

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Microprocessor Architecture, Programming and Application	Gaonkar (Penram International)
2	Microprocessor & Microcomputer	B.Ram (Dhanpatrai)
3	Microprocessor Principle and Application	Ajit Pal (TMH)
4	8 bit Microprocessor	Vibhute & Borole
5	Microprocessor & Microcomputer	A.P Godse (Technical)

COURSE CODE: 5X405

COURSE NAME: ELECTRONICS DEVICES & CIRCUITS II (EDC II)

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	04	02	--	--	06

	Prog. Test	End Exam				
Marks	20	80	25	25	--	150
Exam Duration	01	03	03			

COMPETENCY STATEMENT:

To understand basic analog circuit arrangement using various components & devices.

To construct and test analog circuits consisting of discrete components.

RATIONALE:

This course forms foundation for all courses in electronics and telecommunication and Industrial Electronics. It prepares students to understand construction, operation, characteristics and application of electronics devices.

OBJECTIVES:

- To understand construction and operation of electronic devices.
- To understand working of electronic circuits using discrete devices.
- To verify the characteristics of electronics devices

CONTENTS:

chapter	Topic/subtopics	Marks	Hours
01	01. Wave Shaping circuits 1.1 Types of wave forms: Sinusoidal, Rectangular, Ramp, Pulse Wave form, step waveform, exponential. 1.2 RC Circuits: RC circuit operation, Capacitor charging, RC circuit equation, RC circuit response to square wave, RC integrating circuit, RC differentiating circuit , 1.3 Clipper: Positive, Negative, Biased positive and negative clippers, Combinational clippers, Series and Shunt clippers and their comparison, 1.4 Working, Input & Output Waveforms and Transfer characteristics of all types of clippers, 1.5 Transistorized wave shaping circuits. Clamper: positive and Negative clampers, Simple Numerical's based on above.	10	12
02	Multivibrators 2.1 Transistor Schmitt's Trigger. 2.2. Collector coupled and emitter coupled bistable Multivibrator. 2.3. Methods of triggering: asymmetrical and symmetrical Triggering. 2.4. Collector and base triggering, use of commutating capacitors, 2.5. Monostable and Astable multivibrator.	10	16
03	Sweep Generator 3.1. Voltage sweep generator, General features of time base signals, errors in sweep generator, different methods of generating a time base signal- exponential sweep circuit, 3.2. UJT sweep generator, constant current sweep. 3.3. Miller and Bootstrap time base generator, linearity	10	12

	Improvement in bootstrap sweep Generator. 3.4. Application of time base generator in TV and CRO (block diagram of general purpose of Scope sweep system), current time base generator		
04	04. Power Amplifier 4.1 Class A, Class B, Class C, Class AB amplifiers. 4.2. Push pull complementary symmetry power amplifier. 4.3. Efficiency of power amplifier. 4.4. Boot strapping in complementary symmetry amplifier, bias compensation	12	12
05	05. Oscillators 5.1 Introduction to oscillators, Oscillator operation, Hartley Oscillator, Colpitts Oscillator, 5.2. Phase shift Oscillator, Wein bridge Oscillator, Crystal Oscillator, 5.3. Equivalent circuit of crystal.	12	12
06	Switching circuits 6.1 The diode as a switch, Ideal characteristics. 6.2. Ideal Transistor switch Practical transistor switch, Transistor switching times, Improving switching times	02	06
07	7. Feedback Amplifier 7.1 Introduction, principle of feedback, Advantages/disadvantages of negative Feedback. 7.1. Feedback connection types, effect of negative f/b on gain & BW. 7.2. Practical feedback circuits- voltage series feedback circuit, Current series feedback circuit, voltage shunt feedback, Using transistors	08	10

LIST OF EXPERIMENTS :(Any FIFTEEN)

1. To plot frequency response and calculate cutoff frequency of RC low pass filter
2. To plot frequency response and calculate cutoff frequency of RC High pass filter
3. To observe and draw input ,output waveforms of positive biased and negative biased clipper by changing biasing voltage.
4. To observe input, output waveforms of clamper and note the clamping voltage.

5. To observe and draw waveforms at base and collector of both the transistors of astable multi vibrator and calculate free running frequency.
6. To observe and draw waveforms of bistable multi vibrator.
7. To observe the output waveforms of Schmitt circuit and find UTP, LTP.
8. To observe and draw waveforms at emitter, B1 and B2 of UJT and calculate the frequency of UJT sweep generator, theoretically and practically.
9. To observe and draw waveforms and calculate pulse duration of Monostable multi vibrator.
10. To observe the response of differentiator using various inputs.
11. To observe the response of integrator using various inputs.
12. Study of RC Phase Shift Oscillator.
13. Study of Wein Bridge Oscillator.
14. Study of Colpitt's Oscillator.
15. Study of Hartley Oscillator.
16. To plot frequency response of class A amplifier, calculate its efficiency.
17. To observe the waveforms and calculate efficiency of class B push pull amplifier.
18. To observe the waveforms and calculate efficiency of class C amplifier

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Applied electronics	R S Sedha (S Chand & Company)
2	Integrated Electronics	Millman Halkies
3	Pulse & Switching Circuits	Millman Taub
4	Electronics Devices & Circuits	David Bell (Prentice Hall)
5	Electronics Devices & Circuits	Mottershed

COURSE CODE: 5X406

COURSE: POWER ELECTRONICS

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	-----	25	25	150
Exam Duration	01	03	02			

Dept.coordinator

HOD

Incharge CDC

COMPETENCY STATEMENT:

To understand various thyristor family devices, industrial circuits and application

RATIONALE:-

Many of the systems are electronically controlled in most of the industries, for that purpose the knowledge of power devices and circuits is essential. It is also necessary to maintain the power systems. This course therefore provides the knowledge and the maintenance skill of power devices.

OBJECTIVES:-

- To understand the construction working principle and characteristics of different thyristor.
- To understand the different firing circuits and commutation circuits for the thyristor.
- To develop the simple applications of thyristor.

CONTENTS:

chapter	Topic/subtopics	Marks	Hours
01	Thyristors family: 1.1 SCR, LASCR, TRIAC, DIAC, GTO, PUT, SCS, their Construction, characteristics and principle of operations. 1.2 Thyristors ratings, their performance, 1.3 Transistor analogy of SCR, 1.4 Parallel and series connected SCR's.	08	12
02	Firing circuits for thyristors family 2.1 Methods of turn on of a thyristors, 2.2 Principle features of firing circuits 2.3 Simple R and RC firing circuits, 2.4 UJT pulse triggering circuit, 2.5 Ramp and pedestal triggering circuit.	06	10
03	Commutation circuits of Thyristor family: 3.1 Natural commutation, 3.2 Forced commutation (all types) their advantages and disadvantages, their comparison	05	09
04	Thyristor protections: 4.1 dv/dt and di/dt ratings, 4.2 Snubber circuits, 4.3 Crowbar circuit, 4.4 Heat sink and their uses.	04	08
05	Single phase converter: 5.1 Half wave controlled rectifier with R, RL load, 5.2 Full wave controlled rectifier with R, RL load, 5.3 Half controlled rectifier with R & RL load, 5.4 Fully controlled rectifier with R& RL load. 5.5 Dual converter (No mathematical approach).	08	12
06	Single phase inverter: 6.1 Principle of operation, 6.2 Operation of the single phase bridge inverters, 6.3 Complementary type bridge inverter.	06	10

	6.4 Series and parallel inverter.		
07	Choppers: 7.1 Principle of operation, 7.2 ON-OFF control method, 7.3 Step-up step-down chopper. (No mathematical approach)	04	09
08	Applications of thyristor family: 8.1 Light dimmer circuit, 8.2 Automobile flasher circuit, 8.3 SCR circuit breaker, 8.4 SCR D.C. motor control, 8.5 Triac as AC line switch, 8.6 DC time delay relay using SCR /UJT, 8.7 SCR circuit breaker.	07	10

. LIST OF PRACTICALS. (Minimum 10 experiments)

1. To plot the V-I characteristics of SCR for different values of gate currents.
2. To plot the V-I characteristics of DIAC.
3. To Study UJT as a relaxation oscillator (Draw the circuit diagram, observe the waveforms at Base1 & Base2 of UJT and across the Capacitor and find Frequency.)
4. To Study R and RC Triggering circuits (Draw circuit diagram Observe waveforms across load, thyristor, measure firing angle.)
5. To Study Class B commutation circuits (Draw circuit diagram, Observe the voltage Waveform across both SCR and commutating circuits)
6. To Study Class C and Class D commutation circuits (Draw circuit diagram, Observe the Voltage waveform across both SCR a commutating circuits.)
7. To Study Single phase half wave controlled rectifier with resistive load (Draw circuit Diagram, Measure output voltages and firing angle.)
8. To Study Single phase full wave controlled rectifier with resistive load (Draw circuit Diagram, Take set of readings for output voltage at various firing angles.)
9. To Study Crowbar Circuit (Trace the given circuit, observe the voltage and analyze Protection of SCR.)
10. To Study Step down chopper (Trace the given circuit, Calculate Ton & Toff Hours and find duty cycle.)

11. To Study Step up chopper (Trace the given circuit, Calculate Ton & Toff Hours and find duty Cycle.)
12. To Study Single phase cycloconverter (Trace the given circuit, Observe the output Waveforms and calculate output frequency.)
13. Light Dimmer (Trace the given circuit, Measure the output voltages for various firing Angles.)
14. Universal motor speed control (Trace the given circuit, Measure firing angle and Output voltage.)

15. Study of SCR circuit breaker.

REFERENCE BOOKS:

Sr. No	Title of book	Author and Publication
1	Power Electronics	Rashid (PHI)
2	Power Electronics	R.M. Jalnekar, N.B.Pasalkar (Technical Publication)
3	Power Electronics	Dr. P. S. Bhimbra
4	Power Electronics	P. C. Sen (TMH)
5	Thyristorised power controller	Joshi, Dubey(Wiley Eastern)

COURSE CODE: 5X407

COURSE NAME: DIGITAL COMMUNICATION (DCM)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENTS:

- To understand the features & Components of Digital communication system
- To learn Digital communication techniques.

RATIONALE:

Digital pulse modulation techniques, coding methods, multiplexing, SS modulation. This works as the base of all advanced communication systems. This course contains all the important features of Digital communication. Being the era of technology, students should get exposure of latest concepts of Digital communication like

OBJECTIVES:

- To understand the various aspects of Digital communication
- To understand and compare different analog and digital pulse modulation techniques
- To understand the concept of multiplexing and multiple access techniques.
- To understand the SS modulation

CONTENTS:

chapter	Topics/Subtopics	Marks	Hours
01	1. Introduction of Digital Communication 1.1 Basic digital communication system, block diagram. 1.2 Channel capacity-definition, Hartley's law, Shannon-Hartley theorem and Channel capacity equation, channel noise and its Effect. 1.3 Definition of Information-Properties of information- Entropy. 1.4 Advantages and disadvantages of digital communication	04	10
02	2. Analog Pulse Modulation 2.1 Introduction to pulse modulation –Types-Comparison of Pulse modulation and CW Modulation- 2.2 Advantages and Disadvantages of Pulse modulation 2.3 Sampling theorem, Nyquist rate, Aliasing, Importance of Sampling theorem. 2.4 Different sampling Techniques-Their comparison. Generation and Demodulation of PAM, PWM, PPM , waveform analysis, and their comparison.	07	12
03	3. Digital Pulse Modulation 3.1 Pulse Code Modulation- Block diagrams of PCM transmitter &	08	12

	<p>receiver</p> <p>3.2 Sampling, quantization, quantization error, Comparing, Inter Symbol Interference.</p> <p>3.3 DPCM Transmitter Receiver,</p> <p>3.4 Delta Modulation Demodulation, Block diagram, slope Overload, granular noise.</p> <p>3.5 ADM Transmitter</p> <p>3.6 Comparison of Digital Pulse Modulation Systems</p>		
04	<p>4. Digital Modulation Techniques</p> <p>4.1 ASK, FSK, PSK definition & waveforms, their transmitter and Receiver block diagram and working.</p> <p>4.2 DPSK block diagram of transmitter and receiver</p> <p>4.3 QPSK-QAM transmitter and receiver .</p> <p>4.4 M-ary Modulation Techniques. M-ary PSK, M-ary FSK Systems. Types of QAM-4 QAM- 8QAM.</p> <p>4.5 Bandwidth for each modulation technique and their comparison.</p>	08	12
05	<p>5. Coding methods and Error control</p> <p>5.1. Baud rate, Bit rate.</p> <p>5.2. Line coding - Unipolar, Bipolar –NRZ, RZ, Manchester coding format</p> <p>5.3 Source coding, ASCII, Extended ASCII code, EBCDIC, Baudot code, Unicode, ISO code</p> <p>5.4 Channel coding, Need of Error Control Coding, Types of errors, Causes of error and its effects, Error detection & correction .Parity, Two dimensional parity check, CRC, Linear Block Codes, Hamming code & simple numerical.</p>	07	12
06	<p>6. Multiplexing and Modulation</p> <p>6.1 Need of Multiplexing, SDM, TDM, FDM block diagram and their comparison.</p> <p>6.2 Introduction to WDM.WDM block diagram.</p> <p>6.3 Introduction to Spread Spectrum Modulation System</p> <p>6.4 Direct Sequence Spread Spectrum signal.</p> <p>6.5 Frequency hop spread spectrum, slow frequency hopping and Fast frequency hopping.</p>	08	12
07	<p>7. ISDN</p> <p>7.1 Architecture of ISDN</p> <p>7.2 Services provided by ISDN</p> <p>7.3 ISDN rate access-PRI-BRI</p> <p>7.4 ISDN address structure</p> <p>7.5 ISDN message format</p>	06	10

List of practical

1. Study of Pulse Amplitude Modulation and demodulation.

2. Study of Pulse Position Modulation and demodulation.
3. Study of Pulse Width Modulation and demodulation.
4. Study of Pulse Code Modulation and demodulation.
5. Study of Delta Modulation and demodulation.
6. Study of ASK Modulation and demodulation.
7. Study of FSK Modulation and demodulation.
8. Study of PSK Modulation and demodulation.
9. Study of TDM transmitter and receiver
10. Study of FDM transmitter and receiver
11. To generate following different line codes and decode them-
NRZ (Unipolar)-Bipolar NRZ-RZ Unipolar-Bipolar RZ

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Digital Communication	Siman Haykin (Jhon Wily & sons)
2	Electronic Communication System	William Scheber(PHI)
3	Electronics Communication	Louis E Freznel(Tata Mcgraw- Hill)
4	Data Communication and Networking	Forouzan (Tata Mcgraw- Hill)
5	Communication Systems	Taub and Shilling (Tata Mcgraw- Hill)

COURSE CODE: (5X408)

COURSE NAME: Telecommunication Switching Systems (TSS)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

RATIONALE:

Telecommunication is undergoing radical changes in switching technology so it becomes very essential to learn the different switching systems, their operation and maintainence. This subject is technology subject which expert the students for fault finding servicing and maintaining different telephone instruments, fax, modem, EPABX etc

OBJECTIVES:

The student will be able to:

1. Get familiarized to switching technologies in various communication networks and wireline and wireless telephones.
2. Identify different sections of pushbutton telephone, cordless phone and cell phone.
3. Install and maintain EPABX, FAX, and Modem
4. Get familiarize with business applications of telecommunications

CONTENTS:

chapter	Topics/Subtopics	Hours	Marks
01	Telephone Instruments 1.1 Landline Pushbutton Telephone Instrument, Block Diagram, Operation-Subscriber loop system. 1.2 DTMF Dialing-Different tones used in telephone Exchange. 1.3 Cordless Telephone - Block Diagram, Operation 1.4 Cell Phone- Block Diagram, Operation-important ICs used in Cell phone & their functions. 1.5 Circuits Like Ringer Section, Charging Unit, Repairing and 1.6 Maintenance of Cell phone. Different Accessories of Cellphone.	10	18

02	Switching Systems. 2.1 Electromechanical telephone Exchanges-Step by Step Switching, cross Bar switching. 2.2 Digital Switching-Digital Space and Time Switch -Space Time Space Switch- Space division switching, Time Division Switching. 2.3 Electronic Telephone Exchange-Stored Program Control (SPC). 2.4 2-3-N Stage Switching Networks	10	18
03	3. Traffic Engineering 3.1 Traffic & Trunking-network traffic load and parameters-Grade of service-Blocking probability. 3.2 Switching Hierarchy and routing-Transmission Plan-Transmission system-Numbering plan-Charging plan. 3.3 Signal Techniques- In Channel Signaling-Common Signaling.	10	16
04	4. EPABX 4.1 Block Diagram-Operation-Technical Specifications-Features. 4.2 Installation Procedure-wiring Diagram 4.3 Programming on console, on terminal, on computer. 4.4 Maintenance Techniques. 4.5 Voice over IP Phone	08	12
05	5. Business applications of telecommunications. 5.1 FAX, Block Diagram, Operation. 5.2 Modem, Working Principle-Types-ADSL-Cable Modem. 5.3 Automatic Teller machine (ATM) 5.4 Video Conferencing. 5.5 Tele banking, Tele Shopping, Distance Learning, Telemedicine	10	16

Practicals:

1. Testing and Installation fix Pushbutton telephone.
2. Testing and Installation cordless telephone.
3. Testing and Installation Cell phone.
4. Assignment on Different Accessories available for Cell phone.
5. Visit report on electronic telephone exchange
6. Visit report on Mobile telephone exchange.
7. Installation and testing of EPABX system
8. Draw the layout of given EPABX System.
9. Installation and Testing of FAX Machine.
10. Installation and Testing of Modem.

REFERENCES:

Sr.No	Title of Book	Author and Publication
1	Principle of Telephony	N.N.Biswas

2	Telecommunication Switching System & Network	T.Vishwanathan(PHI)
3	Advance Electronic Communication	Wayne Tomasi(PHI)
4	Mobile & Personal Communication System & Services	Raj Pandya(PHI)
5	Communication electronics	Louise E.Frenzel(TMH)

COURSE CODE: ET (5X410)

COURSE NAME: COMPUTER HARDWARE & NETWORKING (CHN)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	02		04	--	--	06
	Prog. Test	End Exam				
Marks	--	--	--	50	50	100
Exam Duration	--	--				

COMPETENCY STATEMENTS:

- To handle & maintain computer system
- To troubleshoot computer system
- To work on networking of the systems in LAN...

RATIONALE:

The aim of the subject is to teach the basic working of the computer motherboard, peripherals and add-on cards. The subject helps the students to do the maintenance of the Computers, peripherals and its add-on cards. Also he will be able to work on networking of the systems & Peripherals. The subject is practical oriented and will develop the debugging skills in the students.

OBJECTIVES:

Students will be able to-

1. Debug and repair the faults in system & peripherals.
2. Disassemble & Ressemble the Computer system.
3. Install and configure the motherboard and adapter cards
4. Fix PC hardware and software problems.
- 5 Expand and manage PC memory
6. Understand Concepts of Networking, OSI & TCP/IP Models & Network Components.
7. Hands on experience in networking.

CONTENTS:

Chapter no	Topic/subtopic	Marks	Hours
01	1. Overview of IBM PC Architecture 1.1. System configuration, 1.2 IBM PC General layout showing , Various Components 1.3. RAM details, design considerations 1.4. Bus controls & I/O slot details 1.5 power supply	06	06

	<p>1.6 Display adapters and memory cards</p> <p>1.7 Floppy and hard disk drives</p> <p>1.8 The keyboard and mouse</p> <p>1.9 Structuring memory</p> <p>1.10 Bus types: ISA, EISA, PCI, AGP, USB and FireWire</p> <p>1.11 Distinguishing among the x86, Pentium I, II, III, IV and Itanium systems</p>		
02	<p>2 Basic software components</p> <p>2.1 BIOS and device drivers</p> <p>2.2 Comparing operating system versions,</p> <p>2.3 CONFIG.SYS and AUTOEXEC.BAT</p>		02
03	<p>3. Designing a troubleshooting methodology</p> <p>3.1 Running the power-on self-test (POST)</p> <p>3.2 Troubleshooting system faults with POST</p> <p>3.3 Using POST audio and video error codes</p> <p>3.4 Testing for motherboard failures</p> <p>3.5 Isolating keyboard and display problems</p>		05
04	<p>4 WORKING WITH BASIC PC COMPONENTS</p> <p>4.1 CPU types: x86, Pentium I, II, III, IV</p> <p>4.2 Configuring jumper and CMOS settings</p> <p>4.3 Upgrading motherboards</p> <p>4.4 Adding plug-and-play components</p> <p>4.5 Common power supply problems</p> <p>4.6 Making use of input/output devices</p> <p>4.7 Configuring network interface cards</p> <p>4.8 Setting I/O device configurations</p> <p>4.9 Choosing and installing memory</p> <p>4.10 Packaging memory: SIMMs, DIMMs, RIMMs</p> <p>4.11 Memory types: DRAM, EDO, ECC, SDRAM, RAMBUS</p> <p>4.12 Locating failed memory devices using memory diagnostic tests Solving adapter card memory conflicts</p> <p>4.13 IDE, E-IDE, Upgrading to larger hard disks, optimizing hard disk Performance.</p>		05
05	<p>5 Input Output Devices</p> <p>5.1 Types of display adapters: VGA, SVGA and graphic accelerators Accelerated Graphics Port (AGP) video.</p> <p>5.2 Solving common printer problems, Configuring serial and parallel ports</p> <p>5.3 Setting communication parameters, Diagnosing serial port problems.</p>		04
B Computer Networking			
06	<p>OVERVIEW OF PC NETWORKS</p> <p>6 Basic concepts and terminology of network Hardware</p> <p>6.1 Defining a PC local area network, Sharing resources, applications and data</p> <p>6.2 Differentiating LANs and WANs</p> <p>6.3 Media: UTP, twisted pair, coax, optical fiber</p> <p>6.4 Topology: star, bus, ring and tree</p> <p>6.5 Network interface cards and media access</p> <p>6.6 Wireless LAN</p>		03
07	<p>7 LAN Hardware components</p> <p>7.1 Network adapter cards, EIA-568, IEEE 802 standards</p>		03

	7.2 Overview of popular network products Twisted-pair Ethernet, Fast Ethernet, Gigabit Ethernet, Switching hubs Repeaters, bridges, Routers & Switches 7.3 Network protocols SPX/IPX, TCP/IP, SMB, NetBIOS, NetBEUI, HDLC.		
08	8 Peer-to-peer networking 8.1 Sharing and using resources, Windows networking protocols 8.2 Workgroup and domain networking Single point of administration, Accessing Domain and A D Services 8.3 Administration Managing accounts, Monitoring servers 8.4 Integrating network operating systems Connecting Windows workstations		02
09	9 TCP/IP AND THE INTERNET 9.1 TCP/IP protocols and utilities-TELNET, FTP, HTTP, PING, SMTP, DNS and NFS, Accessing the Internet from the LAN 9.2 Role of TCP/IP in intranets and the Internet-Assigning IP addresses Differentiating IP address classes 9.3 Implementation-The role of TCP/IP in PC networks, Supporting TCP/IP in network OS		02

LIST OF PRACTICALS (ANY TWELVE):

1. Demonstration of different connections of peripherals to computer, types of ports and diagnosis of most common problems related to external connections to computer.
2. Study of motherboards; identify types of motherboard identification of ports, switches, sockets, slots, memories, bios, crystal clock, bios supply, CPU compatibility of CPU and motherboards, Identification of different components on motherboard & drawing layout.
3. General diagnosis common problem related to connection of hardware and peripheral parts.
4. Identification of types of power supply. Measurement of typical voltages Power supplies connectors. Troubles shooting of power supply.
5. Identification of Hard disks, connecting, removing, installing, formatting partitioning of hard disk connecting hard disk in master slave configurations Trouble shooting of hard disk problem with software packages.
6. Rectification of symptoms for hard drive and Diagnosis of drive controller card.
7. Connecting drive to controller, Assigning a letter to drive, swapping a drive, Drive cleaning, Track 00 rest, Error code and beep code.
8. Connect, install and configure different printers.

9. Study and comparison of different types of monitors. Display adapter driver installation and settings. General failures and common trouble shooting of display adapters.
10. Checking of keyboard and its connections.
11. Installation of CD / DVD ROM Drive, Sound card and multimedia tools.
12. De assemble & Assemble the personal computer.
13. Installation of OS/Networking OS.
14. Study of Components required for LAN Networking, patch chords preparation & cross
15. Connection cable for LAN.
16. Implementation of LAN using star topology & Connectivity between two computers using cross over UTP CAT5 Cable.
17. Installation of Network Printer

REFERENCES :

Sr. No	Title of Book	Author and Publication
1	Managing & Troubleshooting PCs	Mike Meyers, Scott Jernigan
2	The complete PC upgrade and maintenance guide	Mark Minasi
3	P. C. Upgrading & Maintenance	Biaglow TMH
4	IBM PC and clones	B Govind Rajalu

COURSE CODE: 5X411

COURSE NAME: - SEMINAR (SEM)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	--		02	--	--	02
Prog.	Test			End Exam		
Marks	--	--	--	50	50	100
Exam Duration	--			--		

COMPETENCY STATEMENT:

To develop demonstrational ability & presentational skills.

RATIONALE:

In today's competitive world, the diploma holder's responsibilities in an organization are changing. They should be able to work as a team member effectively with additional qualities like searching of information, assimilation of information & use of innovative ideas etc. They should be able to show above skills during presentation.

OBJECTIVES:

Students will be able

- To search latest information regarding technological advancement from Journals, magazines, industrial visits, Internet.
- To present the ideas, concepts in his own words preferably using Power Point presentation.

GUIDELINES :

- Students are expected to study various periodicals, journals, books, journals, magazines, Internet, reference books etc. and select the advanced topic for the seminar from the
- Students may deliver a seminar based on the project to be selected in the course at final semester level.
- For each seminar there should not be more than two students except seminar based on project.
- Student should prepare presentation using multimedia, charts & OHP slides.

CONTENTS:

Chapter no	Topic/subtopic	Marks	Hours
01	1. Literature Survey: Searching and proposing the seminar topics		
02	2. Topic Selection: Selection of one topic which should not be from the regular Curriculum.		
03	3. Report Writing: Short write up should be prepared on topic selected for seminar.		
04	4. Seminar Presentation: 10-15 min power point presentation Followed by question answer session. 4.1The candidate will deliver the seminar on the selected topic which will be assessed by the guide along with the staff of the department.		

SCHEDULE :

Sr.no	Activity	Duration
01	Topic selection	2 Weeks
02	Finalization of topic	1 Weeks
03	Information collection	5 Weeks
04	Assimilation of information	2 Weeks
05	Preparation of seminar report & presentation using multimedia	4 Weeks
06	Presentation of seminar	2 Weeks

COURSE CODE: 5X412

COURSE NAME: - PROJECT (PRO)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	--		04	--	--	04
Prog. Test				End Exam		
Marks	--	--	--	100	50	150
Exam Duration	--			--		

COMPETENCY STATEMENT:

To design PCB and construct prototype of a small project from a given circuit.

RATIONALE:

This course is compulsory to all the programmes. This course gives the experience about design, building, testing and implementing the ideas while making new electronics instruments. This course is indicator of showing, the details learned by students from other courses.

OBJECTIVES:

- To design new instrument / equipment.
- To collect various information about components.
- To prepare PCB.
- To build and test the circuit.
- To develop presentation skill.

CONTENTS:

Chapter no	Topic/subtopic	Marks	Hours
1	construct and build New electronics equipment / instrument / model etc or Modify and expand of old projects / existing instruments / models. • In all above two cases students are expected to		
1.1	Prepare the layout of circuits.		
1.2	Prepare and design of artwork for circuits		
1.3	Design of various circuit components		
1.4	Preparation of PCB / Understanding the PCB design if it is done from outside agencies.		
1.5	Construction and building of circuit and instrument as a whole.		
1.6	Preparation, design and fabrication of front panel of device and box required for keeping the whole circuit		
1.7	Test the circuit and produce satisfactory results for any one of the electronic equipments.		
1.8	Costing: Cost estimate and optimization of cost for a project		

NOTE:

Above project work should be based on the syllabus for courses prescribed for entire programme. Students should submit report on the work done and result obtained, mentioning the specifications, modifications possible or future expansions possible. Project can be a sponsored project from industries / other organizations or made in institution. Depending upon the project (work) a batch of 2 to 5 should be made for each project (i.e. Batch is decided by project guide).

LABORATORY WORK

- Student should prepare component list of selected project.
- Bring all the components and do the testing of individual component.
- Design the various blocks of circuits
- Build small block of circuits on breadboard and test them.
- Prepare the artwork and layout for PCB.
- Mount the components on PCB.
- Do soldering of all components.
- Test the various results expected.
- Prepare good box for instrument keeping and prepare attractive front panel for it.
- Prepare project report based on the above work, as part of term work.
- Present seminar on project.

Guidelines for project:

1. Students should submit project synopsis within 2 weeks from the start of the semester.
2. Interdisciplinary projects are allowed. However, examination of different branch student will be conducted independently in respective departments.
3. Group should maintain project diary. It should have records of all the phases of project work.
4. Project report should be strictly in the format given by the department

EVALUATION:

While evaluating, more emphasis should be on work done by student, his sincere efforts, his approach and understanding the things rather than successful results / working of instruments.

Continuous assessment of the work done by student should be made.

PROJECT EXECUTION:

Sr. No.	Task	Duration
01	Submission of synopsis	(02 weeks)
02	Finalization of project and guide	(02 weeks)
03	Submission of block diagram and circuit diagram	(01 weeks)
04	Testing of circuit on breadboard and artwork preparation	(03 weeks)
05	PCB preparation (Etching, drilling)	(02 weeks)
06	Mounting of components	(02 weeks)
07	Testing of project	(01 week)
08	First demonstration	(01 week)
09	Final demonstration	(01 week)
10	Finalization of project report	(01 week)

LEARNING MATERIALS:

Linear IC data manuals, Digital IC data manuals, Semiconductor devices manuals, Various old project reports, All types of electronics magazines, Microprocessor handbook, Facilities available in electronics laboratory, The necessary tools.

Course Code: 5X413

Course Name: Visual Basic (VB)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	00		02	--	--	02
	Prog.Test	EndExam				
Marks	---	---	--	25	25	50
Exam Duration	---	---	---			

COMPETENCY STATEMENT:

To develop the skill of visual Basic Programming to build custom standalone applications.

RATIONALE:

This subject helps to understand the principles and techniques involved in developing applications with Visual Basic. The course content is designed to understand & implement the Event Driven Architecture of Visual Programming. The student would be able to identify and use the different categories of controls, learn working with forms and different data access techniques, establish a data base connection and identify the categories of activeX controls and creating them.

OBJECTIVES:

The Students will be able to:

- Use GUI tools of Visual Basic Programming.
- Use basic and advance VB controls.
- Interface back-end and front-end.
- Generate report using Data Report and Crystal Reports.
- Build Visual Basic applications.

CONTENTS:

Chapter no.	Topic/subtopic	Marks	Hours
1	Introduction to Visual Basic Environment 1.1 Concept of VB program, Class, object, property, methods, events. 1.2 Environment of VB. Concept of project forms etc. Managing with 1.3 Menus. Drag and Drop operation. 1.4 Validating and processing user inputs.		04
2.	Introduction to Visual Basic 2.1 Data types, variants. Variables and constants. Arrays – REDIM statement. Array related functions. Collection procedure, function. Argument passing and return values. 2.2 -Input box and message box. Control flow statement. Loop statement. 2.3 Nested Control structure, Exit statement. Arithmetic, logical, relational, string operators. String, maths, Date and Time functions. Date and Time formats. 2.4 Design form to demonstrate. Control loops (do, for, while). Control Statements (if-then, if-then-else, Selection option). Using text box, Command button, Label, options, combo box, input and message box.		04
3.	Controls and Events		04

	<p>3.1 Scroll Bar, Slider, Container</p> <p>3.2 picture box, frame, Image. File System controls</p> <p>3.3 Drive, file, directory list box, Timer control, OLE control. Basic controls like – line, shape, circle, Pset, RGB, Paint picture, Load picture.</p>		
4.	<p>Module, Class Module MDI, Menu Editor and Graphics</p> <p>4.1 Concept of module, class module, MDI, DLL's and how to use them.</p> <p>4.2 Creating own menu using menu editor pop menu.</p> <p>4.3 Advanced controls- Common dialog box, Tree view, List view, rich text box Control, windows common controls, status bar, tab control, image list, MS Chart.</p> <p>4.4 Concept of class module, module MDI, DLL and how to use them. Using RTF Control.</p>		06
5.	<p>DATABASE REPORT GENERATOR</p> <p>5.1 Concept of Database, record, record set, connection. DSN and DSN less connection. Data bound controls</p> <p>5.2. Text box, combo box, list box, DB grid, DB combo, MSflex grid. Visual Data Manager.</p> <p>5.3 Programming with ADO, DAO, RDO, Object connection, record set, parameter, cursor types, lock types.</p> <p>5.4 Creating report using Data report. Creating report using crystal reports.</p>		06
6.	<p>Introduction to Active X Controls</p> <p>6.1 The user control object – initialize Event, Terminate Event, Init properties Event, Paint/Resize Event, Observing the Events in the Data controls.</p> <p>6.2 Exploring the properties of Active X controls – Debugging The properties, extend properties, Ambient properties, creating design time only properties, Creating a Clock control, Events in ActiveX control.</p> <p>6.3 Using the active X control wizard – Adding the wizard to visual basic,.</p> <p>6.4 Property pages – using the property page wizard, creating property pages without the wizard.</p> <p>6.5 Creating a simple ActiveX control</p>		04
07	<p>File Handling In VB</p> <p>7.1- File commands- file handling functions- Sequential files- Reading information from a file- Adding to an existing file- General sequential files- Sending special characters to sequential files.- Making changes inside a sequential file- The rich text box control & file handling</p> <p>7.2 Random access files - Headers and indexes for random access files. Binary files - Binary files HANDLING</p>		04

Practical:

1. Study of VB environment with following details:

- form and their types.
 - intrinsic components – text box, label, combo, list, heck box, and optionbutton.
 - Design time properties.
 - Different windows and their uses.
2. Design forms to perform mathematical operations like
 - addition, subtraction, multiplication and division using : text box, labels.
 - Options to be selected using option, check box and combo box.
 3. Design forms to use Date, Time, and String, Mathematical functions with help of text box, label, radio button, check box, and combo box and command button.
 4. Using image control and scroll bar, design form to change height, width of image, movement to image. Using picture box and image list, flip the image on click of command button.
 5. Design explorer using Directory, drive, file list box and common dialog controls.
 6. Design text editor with menu having copy, cut, paste, select, search, replace the text and load and save the file.
 7. Design stop watch with faculty of start, stop, reset using timer control, option, label, text box.
 8. Practical including Data bound controls like DBgrid, DBcombo,Textbox, Combo, List, MSFl exgrid and Database control like ADO, DAO, RDO toperform insertion, deletion, updation, display, Search.
 9. Design MDI form including Menu bar, Toolbar, Status bar.
 10. Design the interface to perform following operation on the file like create , open , read , write , delete , search.
 11. Design the active X control for login form and transport it to browser
 12. Design the ActiveX control to perform database operation with get and let property
 13. Design the experiment using RTF box to create file , load , save search and edit the file.
 14. Integrate all above practical to form mini project including login form and Splash form.

Books:

01	Bradley, Millstaugh	Programming in VB6	Tata McGraw Hill
02	Nel Jerka	The complete reference – VB6	Tata McGraw Hill
03	Evangelos Petront Sos	Mastering VB6	BPB
04	Content Development group	VB6 Programming	Tata McGraw Hill
05	--	-- VB6 Black book	--

COURSE CODE: 5X414

COURSE NAME: MICROWAVE AND SATELLITE COMMUNICATION (MSC)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENTS:

- To understand the features of high frequency communication system
- To understand components of satellite station and earth station
- To learn communication techniques between satellite and earth station

RATIONALE:

This course contains all the important features of microwave communication. Being the era of technology, students should get exposure of latest satellite communication. This works as the base of all advanced communication systems.

OBJECTIVES:

- To understand the various aspects of microwave communication
- To understand the various aspects of satellite communication

CONTENTS:

chapter	Topics/Subtopics	Hours	Marks
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Dept.coordinator

HOD

Incharge CDC

01	1.Introduction to Microwave & Microwave guides 1.1 History, Microwave frequency bands, Advantages and Applications. 1.2 Types of wave guides, Propagation of wave in rectangular and circular waveguides, TE and TM modes, Field patterns, Propagation of TE and TM waves in rectangular and circular waveguides, 1.3 Various TEM,n and TMm,n modes, Excitation of modes, 1.4 Cut off frequency of wave guide, Guide wavelength, Group and phase velocity	06	10
02	2. Microwave passive devices 2.1 Waveguide coupling, Basic accessories, Multiple junctions, Directional coupler, Isolator and circulator, Cavity resonator.	06	12
03	3. Microwave devices 3.1 Klystron, Reflex klystron, 3.2 TWT, Magnetron, 3.3 Impatt, Tunnel diode	10	12
04	4. Introduction to satellite communication 4.1 History, Frequency bands, Advantages, Applications, 4.2 Communication satellite, 4.3 Introduction to TDMA , FDMA , CDMA	05	10
05	5. Satellite orbit & inclination 5.1 Introduction, Synchronous orbit, Orbital parameter, Look angle, Azimuth and elevations, 5.2 Satellite placement in geostationary orbit, 5.3 Station keeping, 5.4 Satellite stabilization.	06	10
06	6. Communication satellite subsystem & transponder 6.1 Communication satellite subsystem (Block diagram), Electrical power supply, 6.2 Attitude & orbit control, TTC. 6.3 Block diagram of transponder, down converter, Conversion process, LNA, HPA, 6.4 Redundancy configuration, 6.5 Satellite earth station (block diagram), 6.6 Satellite TV receivers, 6.7 Direct Broadcast Satellites	10	16
07	7. Packet satellite communication 7.1 Introduction, Packet switching, Packet communication, 7.2 Random access technique, 7.3 Polling techniques, 7.4 Queuing technique, 7.5 Packet satellite network	05	10

List of Assignments

- 1.Study of Transponder block diagram
- 2.Study & Installation of DTH
- 3.Study of Block diagram of Earth Station
- 4.Study of Switching Techniques in Satellite Communication
and

Any ten assignments based on the course contents and demonstration of microwave link in some laboratory.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Microwave and radar	Sanjeev Gupta (Satya prakashan)
2	Communication system	Dr. Ajay Sharma, Manoj Kumar (Satya prakashan)
3	Electronics Communication systems	George Kennedy (Tata Mcgraw- Hill)
4	Microwave devices and	Samual Liao
5	Satellite communication	Gangliardi, CBS publication
6	Satellite communication	D.C. Agrawal, Khanna publication
7	Satellite communication	Pratt and Bostian

COURSE CODE: 5X415

COURSE NAME: DIGITAL CIRCUITS & SYSTEMS (DCS)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To develop designing capability for various digital systems.

RATIONALE:

This course deals with the designing of the basic circuits in digital electronics. Now a day, many electronics systems are digitized & hence it is necessary to know the concept of designing of a digital circuit in combinational and sequential logic design, using medium scale integrated circuit.

OBJECTIVES:

This course enables students to understand designing concepts of a digital circuit & systems using logic gates, counters, encoders, and decoders. This course also deals with logic families, A to D Converters & D to A Converters.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Combinational Logic Design Using MSI Circuits 1.1 Comparator- Design of 2-bit comparator using logic n gates. 1.2 Design of 8-bit/24bit comparator using IC 7485. 1.3 Parity Gen./Checker- Design of 6-bit and 10-bit odd/even parity checker using 74180. 1.4 Design of parity generator circuit to add an even /an odd parity bit to a 7-bit Word /14-bit word using 74180. 1.5 Code converter- Design of Gray to BCD code converter using MUX IC 74153 and DEMUX IC 74154 . 1.6 Design of BCD to Gray code converter using MUX IC 74151A/74153/74157. 1.7 Design of one digit BCD to binary converter using 74184.	10	15
2.	Encoders and decoders 2.1 Decimal to Binary Priority Encoder IC 74147, 2.2 Octal to Binary Priority Encoder IC74148. 2.3 Design of hexadecimal to binary priority encoder using	08	12

	<p>IC 74148 and IC 74157.</p> <p>2.4 Binary to octal decoder IC 74138, BCD to Decimal decoder IC 74 LS42.</p> <p>2.5 Design of BCD to decimal decoder driving 10 LEDS using IC 7442.</p> <p>2.6 Design of BCD to 7-segment decoder/driver using IC7447.</p>		
3.	<p>Flip-Flops:</p> <p>3.1 Excitation table of flip-flop, clocked flip-flop design,</p> <p>3.2 Edge triggered flip-flops, flip flop conversion.</p>	05	09
4.	<p>Asynchronous Counter Design</p> <p>4.1 Designing of asynchronous counters using ICs 7490, 7492, 7493, 74176, 74196, 74177 and 74197,</p> <p>4.2. Cascading of 7490 ICs.</p>	07	12
5.	<p>Synchronous Counter Design</p> <p>5.1 Design of MOD-N synchronous counter using JK flip-flops. Lockout Condition.</p> <p>5.2 Design of synchronous counters using ICs 74160, 74161, 74163.</p> <p>5.3 Design of synchronous UP/DOWN counters using IC 74168, 74169, 74190, 74193.</p>	08	12
6.	<p>Logic Families</p> <p>6.1 Introduction to Bipolar & Unipolar logic families, Characteristics.</p> <p>6.2 Transistor Transistor Logic- Operation of TTL NAND gate, active pull-up, schottky TTL, comparison of TTL IC families.</p> <p>6.3 Emitter Coupled Logic - Operation.</p> <p>6.4 CMOS Logic Family - CMOS Inverter, NAND, NOR gates.</p> <p>6.5 Comparison of TTL, ECL and CMOS families.</p>	06	12
7.	<p>Study of Digital Systems</p> <p>7.1 Elements of digital system.</p> <p>7.2 Study cases- Calculator, digital clock and frequency counter.</p>	04	08

LIST OF PRACTICALS (ANY TEN)

1. Design a two-bit comparator using logic gates.
2. Design 8-bit comparator using IC 7485.
3. Design 8-bit parity generator/checker using IC 74180
4. Design BCD to Gray code converter using IC 74153.
5. Design Gray to BCD code converter using IC 74157
6. Design of hexadecimal to binary priority encoder using IC 74148
7. Design BCD to seven-segment decoder using IC 7447.
8. Design of clocked flip-flops.
9. Conversion of flip-flops.
10. Design MOD-N counter using IC 7490.
11. Design MOD-N counter using IC 74161.
12. Design up-down counter using IC 74169.
13. Study of TTL logic Families.
14. Study of CMOS logic Families
15. Assignment on digital clock.
16. Assignment on frequency Counter.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Modern Digital Electronics	R.P.Jain (TMH)
2	Digital Electronics & Principal	Malvino Leach (TMH)
3	Digital Electronics	Gothman
4	Digital Electronics Principles & Applications	Tokheim (TMH)
5	Digital Fundamentals	Floyd (UBS)
6	2000 Solved Problems in DE	S.P.Bali (TMH)
7	Digital Circuit Design	Morris Mano (PHI)

COURSE CODE: (5X416)
COURSE NAME: CONTROL SYSTEM (COS)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

Rationale:

The advancement of both knowledge and technique has resulted in the development of controls in process industry. The progression of human existence from a primitive state to the present complex technological world was paced by learning new and improved methods to control the environment. Control means methods to force parameters in the environment to have specific values. Varying the room temperature OR guiding a space craft to Saturn necessities to examine elements of control system. Nature of controller action for systems with operation and variables is highlighted for continuous values. This subject is beneficial for process control variation in any process control industry which equips the student for maintenance and quality analysis.

Objectives:

The student will be able to:

1. Learn and understand about open loop and closed loop systems.
2. Feedback control and transfer function.
3. Steady state, time response, and frequency response analysis.
4. Study of stability
5. Control actions of electronic controllers.
6. Servo system and its application.
7. Process control system and controllers
8. Robotics

Chapter no.	Topic/subtopic	Hours	Marks
1	Overview of Control system 1.1 System- definition & practical example. Control system – definition and practical example. Open loop & closed loop systems – definition, block diagram, practical example, and Comparison 1.2 Laplace transform – Significance in Control System, Linear time varying and time invariant systems – definition, developing differential equations of R-C and R-L-C electric circuits. 1.3 Transfer function – definition, derivation of transfer function for close loop control system. 1.4 Order of a system – definition, 0, 1, 2 order system standard equation, practical examples. 1.5 Block diagram representation of a system- need, reduction rules, problems. 1.6 Signal flow graph- need, reduction rules, problems.	08	18
2	Analysis of control system 2.1 Dynamic analysis of measurement systems definition, time domain and frequency domain analysis. 2.2 Time domain analysis – Transient and steady state response, steady state error. 2.3 Standard test inputs - step, ramp, parabolic & impulse. Need of them, significance, and corresponding Laplace representation 2.4 Poles & zeros – definition. 2.5 Analysis of first order control system for unit step input; concept of time constant 2.6 Time response specifications (no derivations) ; problems on time response specifications	10	12
3	Stability analysis 3.1 S-plane – Introduction 3.2 Stability - stable, unstable, critically stable & conditionally stable system; relative stability; Root locations in S-plane for stable and unstable systems 3.3 Routh's stability criterion-different cases & conditions (statement method); problems (Time response analysis) 3.4 Introduction, advantages & disadvantages of frequency response analysis; frequency response specifications 3.5 Root Locus techniques.	10	18
4	Control actions & process controllers 4.1 Process control system – block diagram ,elements 4.2 Role of controllers in process industry; concept of sequencing & modulating controllers;	08	12

	4.3 Control actions: discontinuous & continuous modes; 4.4 On off controllers: neutral zone 4.5 Proportional controllers (offset, proportional band) integral & derivative controllers; 4.6 Composite controllers; PI, PD, PID controllers		
5	Servo Systems 5.1 Servo system –definition, block diagram, 5.2 AC & DC servo systems- comparison, practical example, schematic diagram , concept and principle 5.3 Servo components: a) Potentiometer as error detector b)Synchro as error detector c)Rotary encoder 5.4 Stepper motor- variable reluctance type, comparison of stepper motor with DC servo motor 5.5 DC servo motor- characteristic, difference from a normal DC motor, comparison between armature controlled and field controlled DC servo motors(no TF) 5.6 AC servo motor-difference from a normal 2 phase induction motor, characteristic of AC Servo meter	09	12
6	Control System Components 6.1 Tachometer, Sensors, Potentiometer as an error detector 6.2 Actuators, Valves and solenoid valves and relays.	03	08

List of Practical:

Perform following any ten experiments with the help of any computational Software like MATLAB etc.

- 1) Program to build Transfer Function (T.F) Object in polynomial ZPK & Plot their responses.
- 2) Find poles and impulse response of the T.F.
- 3) Generation of standard test signals.
- 4) Program for Block diagram reduction.
- 5) Find Root locus for a system with Real poles.
- 6) To Study of AC position servo system.
- 7) To Study of DC position servo system.
- 8) To Study characteristics of potentiometer as error detector.
- 9) To Study characteristics of synchro as error detector.
- 10) To Study Step response of first order R-C circuit.
- 11) To Study Step response of R-L-C second order circuit.
- 12) To Study Temperature controller with on-off controller.
- 13) To Study Temperature controller with PI controller.
- 14) To Study Temperature controller with PID controller

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Digital Control System	M.Gopal Tata McGraw-Hill
2	Control system	I.J.Nagrath & M.Gopal
3	Control System	M.Gopal
4	Modern control system	K.Ogata
5	Control systems	Kumar(Tata McGraw-Hill)
6	Process control instrumentation Technology	C.D.Johnson

COURSE CODE: (5X417)**COURSE NAME: BIOMEDICAL INSTRUMENTATION (BIS)**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To understand various Biomedical instruments and their applications.

RATIONALE:

Due to advancements in electronics it has developed applications in variety of fields. It plays a major role in medical sciences. Hi-fi instruments in hospitals are based on electronics technology. To give exposure to the students in this area its study is essential.

OBJECTIVES:

- To have knowledge of different bio-medical instruments used in medical field and their applications
- To handle various instruments used in hospitals.

CONTENTS:

Dept.coordinator

HOD

Incharge CDC

Chapter no.	Topic/subtopic	Hours	Marks
1	Introduction to instrumentation process 1.1 Introduction to man instrument system, components of man System 1.2 Physiological system of body, problems encountered in measuring a living system.	04	04
2	Medical instrumentation system and transducers 2.1 Physiological transducers pressure, temperature, pulse sensors, respiration sensors, 2.2 source of biogenetical action potential, their principle of operation, construction and applications.	06	12
3	Pathological instruments 3.1 Basic principle and working of photometer, spectrophotometer, Nephelometer, PH meter 3.2 Continuous flow analysis automation and quality control, blood cell counter, auto analyzer	10	12
4	Biomedical recorders and display 4.1 ECG, Electrical activity of heart, electrocardiogram, ECG leads, 2 ECG measurement 4.2 block diagram of ECG machine, block diagram of EMG, EEG machine	06	12
5	Radiology 5.1 Generation of X rays and their characteristics 5.2 typical X ray Machine, image intensification, 5.3 computer axial tomography	06	10
6	Ultrasonic imaging system 6.1 Ultrasonic signal and its properties, 6.2 basic modes of transmission, display modes used in ultrasonography and their applications, 6.3 outline of typical ultrasound instrument, introduction to 6.4 Doppler echocardiography.	06	12
7	Patient Monitoring System 7.1 Heart rate, Pulse rate, respiration rate and blood pressure Measurement.	06	10
8	Safety Aspects Safety standards, current shocks, testing instruments.	04	08

LIST OF PRACTICALS/ASSIGNMENTS/INDUSTRIAL VISITS

- 1) Operation and use of colorimeter
- 2) Identification of different types of PH electrodes use and calibration of PH meter
- 3) Operation and function of all the controls of hospital based X-ray machines
- 4) Measurement of skin contact impedance and techniques to reduce it
- 5) Use of oscilloscope and cardio scope with and without memory
- 6) Direct blood pressure measurement
- 7) Study of ultrasonic equipments
- 8) Study of Blood cell counter
- 9) Study of Nephelometer

10) Study of ECG machine

References:

Sr. No.	Title of Book	Author and Publication
1	Biomedical Instrumentation	Khandpur . (TMH)
2	Biomedical Instrumentation and Measurements	Cromwell (PHI)
3	Bio Electronic Measurements	David Michaels(PHI)

Course Code: (5X501)**Name of the Course: Mobile & Fiber optic Communication (MFO)**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To understand and get aware with the recent trends in fiber optical communication system. To understand Basic Technology, Architecture and applications associated with the current and Future mobile communication systems

RATIONALE:

Fiber optic communication is very important as very soon it will dominate the present communication due to various advantages like ease of operation, minimum loss, flexibility and large data handling capacity. Mobile communication has touched almost all spheres of our life. The recent growth in mobile communication and its applications has increased enormously. For operation and maintenance of the systems, the communication industry requires skilled technicians

OBJECTIVE:

- To understand various aspect of fiber optic communication system
- To study various optical devices
- The student will be able to understand basic concepts & applications of Mobile Communication.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Introduction to fiber optic communication system 1.1 Advantages and disadvantages over conventional communication systems, 1.2 Nature of light, its properties,	04	10

	1.3 General Block diagram of optical Fiber communication system		
2	Propagation of light 2.1 Propagation of light in optical fiber, 2.2 Ray model, Theoretical approach to Wave model, 2.3 Critical angle, Numerical aperture, Acceptance angle. Simple Numericals.	04	08
3	Fiber 3.1 Fiber materials, 3.2 Structure of fiber, Dimension of fiber 3.3 Types of fiber, Step index, Graded index, Single mode. 3.4 Transmission Characteristics of an optical fiber- Attenuation, Signal Distortion in Optical fiber., 3.5 Optical fiber connections: joints and couplers- Fiber alignment and joint loss, fiber splices, -fiber connectors, expanded beam connectors, fiber couplers OTDR –block diagram-working principle	08	12
4	Optical Sources and Detectors 4.1 Optical sources: LED, LASER, -construction and working-Comparison 4.2 Optical detectors :PIN diode ,Avalanche photo diode- construction and working-Comparison	06	16
5	Introduction to mobile communication system 5.1 Evolution of mobile radio communication (1G, 2G, 3G, 5G). 5.2 The cellular concept. Basic Cellular system, Block diagram 5.3 Cell shape, Concept of Frequency Reuse., Channel Planning of Wireless system. 5.4 Co channel and adjacent channel interference. power control for reducing interference. Improving coverage and capacity in cellular systems. 5.5 Concept of cell splitting. 5.6 Sectoring repeater for range extension- Microcell zone concept.	10	12
6	Hand Off Techniques 6.1 Concept of Handoff. 6.2 Types of Hand off..Hard hand off, Soft Hand off. 6.3 Delaying and Queing of Hand off. 6.4 Inter system Hand off.	04	08
7	Digital Cellular Technologies 7.1 Advantages of Digital Cellular Technologies 7.2 Global Systems for mobile communications 7.3 GSM Specifications, Services, Privacy & Security, Channels 7.4 GSM Architecture 7.5 Features & Specifications of IS-95 7.6 Forward channel and reverse channel 7.7 IS-95 Channels and services	12	14

	7.8 Comparison of GSM & IS-95 Systems		
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LIST OF EXPERIMENTS (ANY Twelve)

1. To calculate NA of given optical fiber.
2. To study analog and digital FOC link.
3. Calculate the bending loss in a given optical fiber.
4. Determination of Loss in different lengths of an optical fibers..
5. Study of different types of optical connectors and couplers.
6. To study Characteristics of optical sources
7. To study Characteristics of optical detectors
8. Study of mobile handset. Observation of signal at input, output and different points.
9. To understand and perform charging of Handset.
10. Identify different sections & Components of mobile unit such as ringer section, dialer section, receiver section.
11. Prepare report on visit to mobile exchange.
12. Prepare report on facilities provided by mobile service providers(Plan & Tarrif).
13. Prepare a report on GSM Architecture and Features.
14. Prepare a report on Industrial visit to GSM Mobile company.(BSNI, Airtel, Idea etc.)
15. Any four practical using AT Commands eg. Receive the call, Make the call. Read Message, Send Message, Read the contents of the SIM.

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Optical fiber communication	Gerd Keiser (Tata Mcgraw- Hill)
2	Optical communication	John Gowar (Prentice Hall of India)
3	Optical fiber communication	Kao (Prentice Hall of India)
4	Optical communication	Senior (Prentice Hall of India)
5	Mobile and personal communication Systems and services	Raj Paandya (PHH)

6	Wireless Communications Principles and practice	T.S.Rappaport (Pearson Education)
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COURSE CODE: 5X502

COURSE NAME: ELECTRONICS CIRCUIT DESIGN (ECD)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To design, construct and test small electronics circuit.

RATIONALE:

This course will be useful for designing and preparing small electronics project.

OBJECTIVE:

From this course students will learn to design electronics circuits, like power supply, multivibrator, oscillator, timers using ICs, etc.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Introduction 1.1 Specifications of Electronics components: Resistor, Inductor, Capacitor, Color coding, Coding of semiconductor devices. 1.2 Design of Half wave, Full wave. Bridge rectifier circuit with Capacitor Filter.	04	10
2	Design of Regulated Power supply 2.1 Zener diode shunt regulator design, 78XX / 79XX regulator design, 2.2. Dual power supply, LM 317 regulator design, LM 317 dual tracking regulator, 2.3 IC 723 Low voltage / High voltage regulator design.	10	12
3	Design of Oscillators 3.1 Phase shift oscillator, Wein Bridge oscillator 3.2 Colpitt's oscillator using Op-Amp, 3.3 Crystal oscillator using Transistor, 3.4 UJT Relaxation oscillator.	08	12
4	Design of Pulse & Function Generator Circuit 4.1 Design of Astable Multivibrator, 4.2 Design of Monostable Multivibrator, 4.3 Design of VCO, 4.4 Designs of Schmitt's trigger (All design using 555), 4.5 Design of function generator using IC 8038.	10	18

5	Design of Special Purpose Circuits 5.1 Design of Tone control circuit (Bass Control, Treble control, Active tone control), 5.2 Design of graphic equalizer (5 Band), Design of Diode detector (AM detector). 5.3 Design of Audio power amplifier using LM 380 / TBA 810 5.4 PWM ICs SG3524,Block Diagram 5.5 Instrumentation Amplifiers ICs INA 121,AD624	10	18
6	Reliability and Thermal Considerations 7.1 System reliability, failure, Failure rate, Reliability and MTBF, MTTR, 7.2 Availability, maintenance policy. 7.3 Design of Heat sink, Thermal Analysis, 7.4 Cabinet design. Grounding & Shielding.	06	10

List of Experiments:

The term work will contains **10 Design Assignments** out of which students should assemble & test four designs in lab.

1. Design of Unregulated Power supply
2. Design of regulated power supply using IC 723
3. Design of regulated power supply using IC 317
4. Design of regulated power supply using 78XX series
5. Design of Astable multi vibrator using IC 555
6. Design of Mono Stable multi vibrator using IC 555
7. Design of Wein Bridge Oscillator using OPAMP 741
8. Design of Hartley Oscillator using OPAMP 741
9. Design of Mod 7 counter using JK flip flop
10. Design of function generator using IC 8038
11. Design of audio amplifier using TBA 810
12. Design of UJT relaxation oscillator

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Electronics Circuit design	Prof. S.N.Talwar/ Dr.T.R.Sontakke
2	Electronics Design Principles	Goyal & Khetan, Khanna Publication

COURSE CODE: (5X503)

COURSE NAME: AUDIO VIDEO ENGINEERING (AVE)

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To understand and develop fault finding ability in different types of audio, video and some household electronic systems.

RATIONALE:

This subject is introduced with the view that the students are made familiar with facts ,concepts, working principles ,applications and fault finding abilities in various audio,video and household electronic system. Dramatic development in HDTV,LCD and plasma display,DC-DVD player is going to affect our communication capabilities and life style in a big way .

OBJECTIVES:

- To understand the working of Hi-Fi and PA system and fault finding in them
- To understand the working of Colour TV and fault finding in it.
- To understand the technique of TV signal transmission and reception
- To understand the working of CD-DVD player and fault finding in it.
- To understand HDTV,LCD and plasma display.
- To understand the working of some household electronic systems.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	MICROPHONES & LOUDSPEAKERS 1.1 Principle of microphone, Classification of microphones, 1.2 Construction and working principle of carbon microphone, 1.3 Construction and working principle of Moving coil microphone, 1.4 Construction and working principle of Ribbon (Velocity) microphone. 1.5 Characteristics of Loudspeaker, 1.6 Construction and working principle of Moving coil cone type Loudspeaker. 1.7 Construction and working principle of Horn loudspeaker.	04	10
2	Magnetic Recording and Reproduction of Signals 2.1 Principle of magnetic recording and reproduction 2.2Chice of tape speed-Need for biasing-Tape and tape material 2.3 Record ,replay and erase head	04	10

	2.4 Construction of recording and playback head 2.5 Block diagram of Tape recorder –Function of each block –Working of record amplifier		
3	Audio systems 3.1 Mono and stereo amplifier 3.2 HI-FI amplifier –block diagram 3.3 Graphic Equaliser-circuit diagram and operation 3.4 Dolby NR recording system 3.5 Public Address System: Need and use, block diagram, requirements of a public address system.	06	10
4	Fault finding & alignment of AM radio receiver 4.1 Locating the Faulty stage-Signal substitution Testing-Disturbing-Signal tracing- Stage shorting-Three point testing-Testing by measuring voltages 4.2 Alignment procedure of radio receiver, IF alignment, Aligning the RF section-Alignment chart. Discriminator alignment, Front end alignment, 4.3 Probable fault in radio receiver. 4.4 Symptoms and remedies on it.	04	08
5	CD-DVD PLAYER 5.1 player block diagram and operation. 5.2 CD player mechanism –CD pick up assembly-gear system-drive motors-CD lens 5.3 DVD player block diagram –working.	04	08
6	TV FUNDAMENTALS 6.1 Sound and picture transmission, The scanning process, 6.2 Characteristics of the human eye, Brightness perception and photometric Quantities, Aspect ratio and rectangular scanning, Persistence of vision and Flicker, Vertical resolution, 6.3 The kell factor, Horizontal resolution and video bandwidth, Interlaced scanning 6.4 Vestigial sideband transmission 6.5 Composite Video signal-.Waveform- Pedestal height ,Blanking pulse,Colour burst, Horizontal and vertical sync pulse details.Equalising pulses.CCIR-B standard for colour TV transmission and reception. 6.6 Colour theory-primary colour-secondary colour-additive and subtractive colour mixing	10	12
7	TV TRANSMITTER AND RECEIVER 7.1 Block diagram of monochrome TV transmitter 7.2 Block diagram of colour TV transmitter 7.3 Block diagram of monochrome TV receiver. 7.4 Block diagram of colour TV receiver	08	12
8	FAULTS IN TV RECEIVER	04	04

	8.1 Probable Faults their remedies in TV receiver.		
9	CABLE TV AND SATELLITE TV 9.1 Cable TV working principle –Dish antenna- 9.2 MATV-CATV-CCTV-DTH 9.3 Satellite TV network	04	06

LIST OF EXPERIMENTS (ANY TEN)

1. Study the given Hi-Fi amplifier system.
 - i) Draw the circuit diagram of output stage
 - ii) Voltage analysis of the given Hi-Fi amplifier system
2. Fault finding in a HI-FI audio amplifier.
 - i) By signal injection method
 - ii) Confirmation of faulty stage by voltage analysis method.
3. Study of directional characteristics of Loud speaker and microphone using sound level meter.
4. Plot the graph of sensitivity, selectivity and fidelity of AM radio receiver to frequency response of graphic equalizer..
5. Voltage wave analysis at various points in AM radio receiver.
6. Fault finding and remedies in AM radio receiver
7. Draw and study drive mechanism layout of CD player..
8. Fault finding in CD player (Three different faults)
9. Study of DVD player
10. Tracing picture tube and video amplifier in a given TV receiver.
11. Fault finding in a given TV receiver. (Four different faults)
12. Study of TV pattern generator
13. Visit to TV center (Transmitter unit

REFERENCES:

Sr. No	Title of Book	Author and Publication
1	Electronics Communication systems	George Kennedy(Tata Mcgraw-Hill)
2	Electronics Communications	Roody Coolen(Prentice Hall of India)
3	Principles of communication Engineering	Anokh SinghS (S Chand)
4	Principles of communication	Taub & Schilling(Tata Mcgraw-Hill)
5	Radio and Television Engineering	S P Sharma(Satya prakashan)
6	Consumer electronics	R G Gupta (Tata Mcgraw- Hill)
7	Radio Engineering (Vol I &II)	G K Mittal
8	Television and video engineering	A M Dhake (Tata Mcgraw- Hill)
9	Monochrome and Colour television	R R Gulathi (New Age international Ltd)

COURSE CODE: 5X504**COURSE NAME: MICROCONTROLLERS (MIC)**

Particulars	Theory		Practical	T.W.	Oral	Total
Credits	03		02	--	--	05
	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To understand Microcontroller architecture & its interfacing to design dedicated applications.

RATIONALE:

MCS-51 family of microcontrollers is increasingly used now a days almost in all applications. Hence it is essential to understand basics of Microcontrollers & Know more about applications.

OBJECTIVES:

This course contains basics of Microcontroller Basics, Memory organization, architecture of 8051 microcontroller, its programming and few applications based on it.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Introduction to Microcontrollers. 1.1 Comparisons of Microcontrollers, Microprocessor & Microcomputers. 1.2 Overview of Microcontroller architecture, 1.3 Types of Microcontrollers 1.4 CISC, RISC Processors 1.5 Harvard & Von Neumann Architectures 1.5 Commercial Microcontroller Devices.	06	12
2	The 8051 Architecture 2.1 Architecture of 8051, Block Diagram of 8051, Pin Diagram. 2.2 Oscillator & Clock circuit, 2.3 Program Counter & Data Pointer, 2.4 Flags & PSW, Stack & Stack Pointer, 2.5 Special Function Registers, 2.6 Internal memory, 2.7 Input/Output pins, ports & Circuits.	09	12
3	8051 Addressing modes & Instructions & ALP 3.1 8051 Addressing modes, 3.2 8051 Instruction sets & their Classifications 3.3 Simple programs on 8051.	09	16
4	Counters & Timers, Serial Communication, Interrupts 4.1 Timer Interrupts, Timer modes of Operation, Counters. 4.2 serial data transmission & reception, modes, Interrupts.	08	12

	4.3 Interrupt sequence, interrupt priority and interrupt control, 4.4 Power saving modes.		
5	8051 I/O Interfacing & Applications 5.1 LED, push button, Relay, optocoupler interfacing. 5.2 Seven segment displays, LCD Interfacing. 5.3 Keyboard Interfacing 5.4 ADC,DAC Interfacing. 5.5 Stepper motor Interfacing	08	12
6	Assembly Language Programming Tools 6.1 Development System tools, Editor, Assembler, Linker. 6.2 Creating Various files to run 8051 programs(.asm,.obj,.lst & hex files) 6.3 Software Simulators. 6.4 KIEL IDE Development tool, 6.5 Procedure to develop project using keil,8051 programs using Keil.	04	06
7	Overview of MCS-51 Microcontroller Family 7.1 Comparative study of salient features of 8051 & its derivative like 89C51, 89C52, 80C2051, 89C2052	04	10

LIST OF EXPERIMENTS (ANY TEN)

1. Study of 8051 kit.
2. Addition / Subtraction program (Data stored in internal RAM).
3. Addition / Subtraction program (Data stored in external RAM).
4. ALP for 8 bit Multiplication & Division.
5. ALP for finding largest number in the set of given numbers.
6. ALP for Arranging a series of numbers in Ascending/Descending order.
7. ALP to find 0's and 1's in the given number.

Interfacing following with 8051 board

8. LED Interfacing
9. LCD interfacing.
10. ADC/DAC interfacing.
11. Hex key board interfacing
12. Stepper motor interfacing.

REFERENCES:

Sr. No.	Title of Book	Author and Publication
1	The 8051 Microcontroller Architecture, Programming & Applications	Kenneth J.Ayala(Penram International)
2	Microcontroller Theory & Applications	Ajay V.Deshmukh(TMh)
3	The 8051 Microcontroller & Embedded systems Using Assembly & C	Mazidi,Mazidi & Mckinlay (Pearson Education)
4		
5.	The 8051 Microcontroller & Embedded systems Using Assembly & C	Mazidi,Mazidi & Mckinlay (Pearson Education)

COURSE CODE: 5X505

COURSE NAME: Microcontroller Based Systems (MBS)

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	03	02	--	--	05

	Progressive Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY: The student will be able to understand as well as design microcontroller based systems, using MCS-51/PIC Microcontrollers.

Rationale:

Students will be able to develop microcontroller based systems for different applications using different I/O devices.

Objectives:

The student will be able to

- Develop micro controller based system.
- To study Software development for a microcontroller based system.

CONTENTS

Chapter no.	Topic/subtopic	Marks	Hours
1	Introduction to PIC Microcontroller 1.1 Overview of PIC16F877A Microcontroller 1.2 Features of PIC16F877A: RISC CPU, Harvard Architecture, Timers, Capture Compare PWM modules, Synchronous Serial port with SPI & I ² C, USART, Parallel Slave port, Brown-out detection, ADC, analog comparator, watchdog timer 1.3 Criteria for selecting a microcontroller 1.4 Comparison of 8051 Microcontroller with PIC16F877A Microcontroller	12	08
2	Architecture of PIC16F877A 2.1 Pin diagram & Pin functions 2.2 Functional block diagram & its description 2.3 Memory Organization: Data memory & Program memory 2.4 Block diagram of Timer-0 2.5 Block diagram of A/D converter	20	12
3	Registers of PIC16F877A 3.1 Status register, Option register 3.2 Configuration Word 3.3 Port Registers & TRIS Registers, PCON 3.4 T1CON, T2CON, INTCON 3.5 ADCON0, ADCON1	14	08
4	Introduction to IDE For PIC 4.1 Assembling & Linking a PIC Program 4.2 Compiler, Assembler, Linker, Debugger, Simulator, Emulator, Cross Compiler, Cross Assembler 4.3 MPLAB IDE Features 4.4 Procedure to create & run a program using MPLAB IDE	08	04
5	PIC16F877A Programming in C 5.1 Data types in C 5.2 Variable & Port Pins declaration in Embedded C 5.3 C & Assembler Directives - #include, RADIX, _CONFIG,	10	07

	#define, EQU, SET, ORG, END, LIST 5.4 Simple programs for time delay, I/O operations, I/O bit manipulation, Logic Operations, arithmetic operations 5.5 Square wave generation using timers		
6	Peripheral Interfacing with PIC16F877A 6.1 Interfacing of LED, Switch 6.2 Interfacing of Relay, Stepper Motor 6.3 Interfacing of 7 segment display, LCD, 6.4 Interfacing of hex Keyboard 6.4 Interfacing of ADC, DAC	16	09

Practical/Tutorials (Any eight)

1. Introduction to MPLAB IDE
2. Develop & Simulate C language program for blinking of LEDs.
3. Write a C Program to demonstrate I/O Operations
4. Write a C Program to demonstrate I/O bit Manipulations.
5. Write a C program to demonstrate various Logical operations.
- 6.. Develop & simulate C language program to ON/OFF LED using key connected at port.
7. Develop & simulate C language program to generate a square generation using timer.
8. Develop & simulate C language program to bring in a byte of data serially one bit at a time.
9. Interface 7-segment display.
10. Interface LCD.
11. Interface stepper motor.
12. Interface ADC.

REFERENCES:

Sr. No.	Title of Book	Author and Publication
1	Programming and customizing the PIC Microcontroller	Michael Predko, Mcgraw Hill
2	Designing Embedded System with PIC Microcontroller, Principals & Applications	Tim Wilmshurst, Newnes
3	PIC Microcontroller: An Introduction to software & hardware Interfacing	Han-Way huang, Cengage Learning 2005
4	Microcontroller Programming – The Microchip Chip	Julio Sanchez & Maria Canton, CRC Press
5	PIC16F87XA Datasheet & Reference Manual for PIC Mid-Range MCU Family	Microchip Inc.
6.	Microcontrollers	Ajay V Deshmukh
7.	PIC Microcontroller and Embedded System	Muhammad Ali Mazidi

COURSE CODE: 5X506

COURSE NAME: - Digital Signal Processing (DSP)

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	03	02	--	--	05

	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

The student should be aware of advanced techniques in processing of signals by digital methods.

RATIONALE:

Processing of signals using digital methods is used in almost all computer based applications such as speech processing, image processing, Artificial Intelligence etc. Hence it is essential for students to know basics of digital signal processing.

OBJECTIVES:

Students will study about the signal processing, signals & systems, its classification, Z-transform, few applications using DSP. They are also introduced to DSP processor TMS320C55X.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Signals system and signal processing 1.1. Signals, Systems, Analog Signal Processing. 1.2 Basic elements of a digital signal processing system & its requirements, 1.3 Advantages of digital over analog signal processing, Introduction to application areas of DSP.	02	04
2	Classification of signals 2.1 Multi channel and multi dimensional signals 2.2 Continuous time versus discrete time signals, 2.3 Continuous valued versus discrete valued signals, 2.4 Deterministic versus random signals, 2.5 Periodic versus periodic signals, 2.6 Symmetrical versus asymmetrical signals, 2.7 Energy and power signals, 2.8 Odd and even signals.	04	06
3	Signal operations 3.1 Standard test signals, 3.2 Operations like shifting, folding, addition, folding-shifting & shifting-folding, Amplitude Scaling, Multiplication, Sample rate increase & decrease operations, Time Scaling.	06	10
4	Sampling Aliasing & Reconstruction 4.1 Sampling, Aliasing, 4.2 Sampling theorem, 4.3 Reconstruction of signals, 4.4 Quantization, Coding.	05	08

5	Systems 5.1 Classification of systems, Static and dynamic, time variant and time invariant Systems, linear and non linear, causal and non causal, stable and unstable systems.	05	12
6	Linear time invariant system and convolution 6.1 Convolution sum of LTI system, 6.2 Properties of convolution sum, 6.3 Stability Criteria.	05	06
7	Correlation 7.1 Concept of correlation 7.2 cross correlation 7.3 auto correlation 7.4 Properties of auto correlation & cross correlation.	05	06
8	Fast Fourier Transform 8.1. Introduction 8.2. Radix 2 FFT Algorithm 8.2.1. Decimation in Time (DIT) 8.2.2. Decimation in Frequency (DIF) 8.3 Bit Reversal	08	16
9	Fundamentals of IIR & FIR 9.1. Introduction to Digital filter 9.2. Digital filter over analog filter 9.3. Disadvantages of Digital filters 9.4. Characteristics comparison of FIR and IIR filter 9.5. Filter design steps for IIR and FIR filters	03	06
10	DSP Processors & Applications 10.1. Pipeline concept 10.2 Harvard architecture 10.3 Introduction to TMS 320 family 10.3.1 Overview, features of TMS320C55X 10.4 Comparison of Microprocessor with DSP Processor. 10.5 DTMF signal detection, Musical sound processing & Radar.	05	06

LIST OF PRACTICALS:

Perform following any ten experiments with the help of any computational Software like MATLAB etc.

1. Introduction to MATLAB environment.
2. Generation of discrete time signal like
 Sinusoidal, step, ramp, impulse, real valued, complex valued, noise

Using MATLAB.

3. Generation of Waveform using MATLAB.
4. To perform the basic operation on discrete time signal.
5. To study continuous time signal and discrete time signal.
6. To study Sampling process and sampling theorem.
7. To study the aliasing effect on sampling of signal.
8. To study and perform the correlation using MATLAB.
9. To study convolution sum of two sequences.
10. Design of Infinite Impulse Filter.
11. Design of Finite Impulse Filter.
12. To study of TMS320C55X Processor.
13. To study of DTMF signal detection.
14. To study of Musical sound processing.
15. To study of Radar.

REFERENCES:

Sr. No.	Title of Book	Author and Publication
1	Digital Signal Processing Principle, Algorithm & Applications	John Proakis, Manolakis (PHI)
2	Digital Signal Processing	N.G.Palan (Technova)
3	Digital Signal Processing	S.K.Mitra (TMH)

COURSE CODE: (5X507)

COURSE NAME: INDUSTRIAL AUTOMATION (IAU)

Particulars	Theory	Practical	T.W.	Oral	Total
Credits	03	02	--	--	05

	Prog. Test	End Exam				
Marks	20	80	--	25	25	150
Exam Duration	01	03				

COMPETENCY STATEMENT:

To understand role of electronic control in various industries.

RATIONALE:

This course is introduced with the view that the students will get exposure to various electronic controls, various transducers & automation techniques.

OBJECTIVES:

Students will study different sensors, various processes involved in industry automation.

CONTENTS:

Chapter no.	Topic/subtopic	Hours	Marks
1	Production Operation and Automation Strategies 1.1 Types of Automation, reasons for automation. Manufacturing industries, 1.2 Types of production, functions in manufacturing, 1.3 Organization and information, processing in manufacturing, plant layout, automation strategies.	06	12
2	Introduction to Process Control 2.1 Control systems, feedback control systems, 2.2 Process control block diagram, 2.3 Control system evaluation, 2.4 Analog and Digital processing.	06	12
3	Mechanical Sensors 3.1 Displacement sensors, level sensors, motion sensors, pressure sensors, flow sensors.	06	12
4	Controller Principles 4.1 Process characteristics, control system parameters, 4.2 Principles of various control modes : two position mode, proportional control mode, integral control mode, derivative control mode, PI control mode, PD control mode, PID control mode. 4.3 Final control operation, signal conversions, actuators, control Elements	08	12
5	Analog Controllers: 5.1 General features: typical physical layout, front panel, side panel, 5.2 Electronic Controllers : Error detector, two position on-off controller, OPAMP based controller for proportional mode, integral mode, derivative mode, PI mode, PD mode, PID mode.	08	12

6	Digital Controllers 6.1 Digital electronics methods, Computers in process control: PLC, Data Logger, Data Acquisition System, supervisory control, 6.2 Computer based Controller.	08	10
7	Robotics 7.1 Robotics- Definition, Concept. 7.2 Functional Diagram of Robotics, DOF, End Effectors 7.3 Application, Advantages and Classification of Robotics.	06	10

LIST OF EXPERIMENTS : (ANY TEN)

1. Implementation of proportional controllers using OPAMP.
2. Implementation of derivative controllers using OPAMP.
3. Implementation of Integral controllers using OPAMP.
4. Implementation of proportional – integral controllers using OPAMP.
5. Implementation of proportional –derivative controllers using OPAMP.
6. Implementation of PID controllers using OPAMP.
7. Implementation of Digital two-position controller using OPAMP.
8. Study of temperature controller.
9. Study of SCADA
10. Study of data loggers.
11. Assignment on sensors
12. Assignment on controller
13. Visit to any process industry and submission of report.

REFERENCES:

Sr.No	Title of Book	Author and Publication
1	Process Control Instrumentation Technology	C.D.Johnson (PHI)
2	Electronic & electrical measurements and Instruments	Sawhney (Dhanpatrai)
3	Electronic Instrumentation	Kalsi (TMH)
4	Electronic Instrumentation	S.K.Khedkar (P.V.G.P.)
5	Modern Control Engineering	K.Ogata (PHI)
6	Electronic measurements and Instrumentation	Oliver Cage (TMH)
7	Automation, Production systems & computer Integrated Manufacturing	Mikell P.Groover (PHI)

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Exemption Credits & Offered Credits for candidates admitted to
First/Second Year in 5th Revision of Curriculum 2012-2013

XII Science

Sr No	Entry Category	Exempted Courses as per new Curriculum		Exempted Credits	Courses Offered as per new Curriculum		Offered Credits		
		Course Code	Credits		Course Code	Credits			
01	XII Science	5G101(BMT)	04+00	04	5G105(WSP)	00+03	03		
		5G102(EMT)	04+00		5G106(EGP)	02+02		04	
		5G103(EPH)	03+02		05	5G107(BCS)*		01+02	03
		5G104(ECH)	03+02		05	5X201(C&T)		00+04	04
		5G301(ENG)	02+02		04	5X203(ETG)		04+02	06
		5G302(CMS)	01+02		03	5X204(EDC1)		04+02	06
		5G304(ENS)	02+00		02	5X205(DE)		03+02	05
						Non Exam		00+02	02
					27				33
*Student having passing certificate of MSCIT Exam. shall be eligible for exemption at entry level in BCS(5G107)									

XII Science PCB group

Sr No	Entry Category	Exempted Courses as per new Curriculum		Exempted Credits	Courses Offered as per new Curriculum		Offered Credits		
		Course Code	Credits		Course Code	Credits			
01	XII Science				5G105(WSP)	00+03	03		
					5G106(EGP)	02+02		04	
		5G103(EPH)	03+02		05	5G107(BCS)*		01+02	03
		5G104(ECH)	03+02		05	5X201(C&T)		00+04	04
		5G301(ENG)	02+02		04	5X203(ETG)		04+02	06
		5G302(CMS)	01+02		03	5X204(EDC1)		04+02	06
		5G304(ENS)	02+00		02	5X205(DE)		03+02	05
						Non Exam		00+02	02
						5G101(BMT)		04+00	04
						5G102(EMT)		04+00	04
		19			33				
*Student having passing certificate of MSCIT Exam. shall be eligible for exemption at entry level in BCS(5G107)									

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Exemption Credits & Offered Credits for candidates admitted to
First/Direct Second Year in 5th Revision of Curriculum 2012-2013

XII Science Technical

Sr No	Entry Category	Exempted Courses as per new Curriculum		Exempted Credits	Courses Offered as per new Curriculum		Offered Credits
		Course Code	Credits		Course Code	Credits	
01	XII Science Technical	5G101(BMT)	04+00	04	5G107(BCS)*	01+02	03
		5G102(EMT)	04+00	04	5X201(C&T)	00+04	04
		5G103(EPH)	03+02	05	5X203(ETG)	04+02	06
		5G104(ECH)	03+02	05	5X204(EDC1)	04+02	06
		5G105(WSP)	00+03	03	5X205(DE)	03+02	05
		5G106(EGP)	02+02	04	Non Exam	00+02	02
		5G301(ENG)	02+02	04			
		5G302(CMS)	01+02	03			
		5G304(ENS)	02+00	02			
			34			26	
*Student having passing certificate of MSCIT Exam. shall be eligible for exemption at entry level in BCS(5G107)							

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Exemption Credits & Offered Credits for candidates admitted to
First/Direct Second Year in Revised Curriculum 2012-2013

XII SCIENCE Vocational (Electronics C2)

Sr No	Entry Category	Exempted Courses as per new Curriculum		Exempted Credits	Courses Offered as per new Curriculum		Offered Credits
		Course Code	Credits		Course Code	Credits	
01	XII Vocational (C2)	5G101(BMT)	04+00	04	5G106(EGP)	02+02	04
		5G102(EMT)	04+00	04	5G107(BCS)*	01+02	03
		5G103(EPH)	03+02	05	5X203(ETG)	04+02	06
		5G104(ECH)	03+02	05	5X205(DE)	03+02	05
		5G105(WSP)	00+03	03	Non Exam	00+02	02
		5X201(C&T)	00+04	04			
		5X204(EDC1)	04+02	06			
		5G301(ENG)	02+02	04			
		5G302(CMS)	01+02	03			
		5G304(ENS)	00+02	02			
			40			20	
*Student having passing certificate of MSCIT Exam. shall be eligible for exemption at entry level in BCS(5G107)							
XII SCIENCE Vocational (Computer Science D9)							
02	XII Vocational (D9)#	5G101(BMT)	04+00	04	5G106(EGP)	02+02	04
		5G102(EMT)	04+00	04	5X201(C&T)	00+04	04
		5G103(EPH)	03+02	05	5X203(ETG)	04+02	06
		5G104(ECH)	03+02	05	5X204(EDC1)	04+02	06
		5G105(WSP)	00+03	03	5X205(DE)	03+02	05
		5G107(BCS)	01+02	03	Non Exam	00+02	02
		5G301(ENG)	02+02	04			
		5G302(CMS)	01+02	03			
		5X301(CPR)#	02+04	06			
			39			27	
# 5X301 CPR is course from III semester							

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Exemption Credits & Offered Credits for candidates admitted to
First/Direct Second Year in Revised Curriculum 2012-2013

ITI

Sr No	Entry Category	Exempted Courses as per new Curriculum	Exempted Credits	Courses Offered as per new Curriculum	Offered Credits
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Dept.coordinator

HOD

Incharge CDC

		Course Code	Credits		Course Code	Credits	
01	ITI	5G101(BMT)	04+00	04	5G102(EMT)	04+00	04
		5G103(EPH)	03+02	05	5G107(BCS)*	01+02	03
		5G104(ECH)	03+02	05	5X203(ETG)	04+02	06
		5G105(WSP)	00+03	03	Non Exam	00+02	02
		5G106(EGP)	02+02	04			
		5X201(C&T)	00+04	04			
		5X204(EDC I)	04+02	06			
		5X205(DE)	03+02	05			
		5G301(ENG)	03+02	05			
		5G302(CMS)	01+02	03			
		5G304(ENS)	02+0	02			
				46			
Student having passing certificate of MSCIT Exam. shall be eligible exemption at entry level in BCS(5G107)							

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Exemption Credits & Offered Credits for candidates admitted to
First/Direct Second Year in Revised Curriculum 2012-2013

MCVC

Sr No	Entry Category	Exempted Courses as per new Curriculum		Exempted Credits	Courses Offered as per new Curriculum		Offered Credits
		Course Code	Credits		Course Code	Credits	

Dept.coordinator

HOD

Incharge CDC

01	ITI/MCVC	5G101(BMT)	04+00	04	5G102(EMT)	04+00	04
		5G103(EPH)	03+02	05	5G107(BCS)*	01+02	03
		5G104(ECH)	03+02	05	5X203(ETG)	04+02	06
		5G105(WSP)	00+03	03	5X205(DE)	03+02	05
		5G106(EGP)	02+02	04	Non Exam	00+02	02
		5X201(C&T)	00+04	04			
		5X204(EDC I)	04+02	06			
		5G301(ENG)	02+02	04			
		5G302(CMS)	01+02	03			
		5G304(ENS)	02+0	02			
				40			20
*Student having passing certificate of MSCIT Exam. shall be eligible exemption at entry level in BCS(5G107)							

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Offered credits for Change of Branch candidates within the same Institute
(Revised Course) 2012- 2013

Change of Branch after First Semester

SrNo	Entry Category	Courses Offered as per new Curriculum		Offered Credits
		Course Code	Credits	
01	ME/AE to ET	5X201(C&T)	00+04	04

Dept.coordinator

HOD

Incharge CDC

		*5X203 (ETG)	04+02	06
		Total credits to be offered		10
02	CE to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		Total credits to be offered		10
03	EE to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		Total credits to be offered		10
04	CO/IT to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		Total credits to be offered		10
*If student has already registered and passed subject equivalent /similar to 5X203(ETG) in I sem he should be awarded exemption in 5X203(ETG)				

Government Polytechnic, Aurangabad

Department of Electronics & Telecommunication

Offered credits for Change of Branch candidates within the same Institute
(Revised Course) 2012- 2013

Change of Branch after Second Semester

SrNo	Entry Category	Courses Offered as per new Curriculum		Offered Credits
		Course Code	Credits	
01	ME/AE to ET	5X201(C&T)	00+04	04

Dept.coordinator

HOD

Incharge CDC

		*5X203 (ETG)	04+02	06
		*5X204(EDC I)	04+02	06
		5X205 (DE)	03+02	05
		Total credits to be offered		21
02	CE to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		*5X204(EDC I)	04+02	06
		5X205 (DE)	03+02	05
		Total credits to be offered		21
03	EE to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		5X204(EDC I)	04+02	06
		5X205 (DE)	03+02	05
		Total credits to be offered		21
04	CO/IT to ET	5X201(C&T)	00+04	04
		*5X203 (ETG)	04+02	06
		*5X204(EDC I)	04+02	06
		*5X205 (DE)	03+02	05
		*5X301(CPR)	02+04	06
		Total credits to be offered		28
<p>*If student has already registered and passed subject equivalent /similar to 5X204 (EDC I) , 5X205 (DE) ,5X203 (ETG) & 5X301 (CPR) in I or II semester he should be awarded exemption in 5X204(EDC I) , 5X205(DE) , 5X203 (ETG) & 5X301 (CPR) respectively.</p>				