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Preface

Today is age of Computers. It has created a boom in the knowledge sector and India has a emerged as super knowledge power in the new millennium. The demand of technical manpower in the field of Computer Engineering is increasing day by day. As a step towards providing such manpower, a number of polytechnic have started offering diploma course in Computer Engineering. There has been a demand to prepare a curriculum in Computer Engineering which meets the requirements of Industry. For this purpose, Composite Curriculum Development Centre establish in this directorate organized series of workshops to update the curriculum in Computer Engineering. The present report is outcome of these workshops.

This curriculum document in Computer Engineering is an effort to incorporate latest advancements in the field of computer engineering. It offers a wide section spectrum of job Opportunities to the diploma holder in computer engineering. In the curriculum workshop, experts from industries and experienced polytechnic teachers deliberated on following topics.

i) Discussions on feedback received from potential industries.
ii) Open house discussions based on experience of participants of workshop for design of curriculum.
iii) Discussion about employment opportunities.
iv) Discussion about job profile of diploma holders in Computer Engineering.
v) Determination of course objectives.
vi) Determination of curriculum area and working out detailed contents.
vii) Preparation of study and evaluation scheme.
viii) Working out resources for implementation

Efforts have been made to provide appropriate learning experiences to the students by class room instructions, laboratory work, work shop practice and project work to develop desired knowledge and skills in the students. In additions, the curricula also lays con siderable emphasis on developing problem solving skill, communication skills, interpersonal skills and entrepreneurship development.

The success of a curriculum depends on its implementation and we hope that efforts will be made to implement the course in the light of recommendations made.

B.R. Verma I.A.S.
Director,
Technical Education,
Vocational & Industrial Training,
Himachal Pradesh,
Sundernagar.

DIPLOMA PROGRAMME
IN
COMPUTER ENGINEERING
(For Himachal Pradesh)

Salient Features:

Name of the Programme	➢ **Diploma Programme in Computer Engineering**
Duration	➢ Three Years (Six Semester)
Entry Qualification	➢ 10+
Intake	➢ 30
Pattern	➢ Semester System
Number of Semester	➢ Six
Ration Between Theory and Practice	➢ 40:60

EMPLOYMENT OPPORTUNITIES

In general, the jobs for diploma holders in the field of Computer Engineering are available in the following areas:

i) Service Division : Maintenance, Service and installation of computer systems.

ii) Production and Quality Control Division.

iii) Marketing Division

iv) Commercial Division

v) Research and Development.

The student are eligible to take up the following employment after undergoing this course.

(a) **Wage Employment**:-

i) Service engineer/customer engineer/junior service engineer /maintenance engineer in installation, service and maintenance of computer systems and microprocessor based system and products.
ii) Assembly supervisor /shop floor manager in manufacturing and production activities.
iii) Technical Assistant/Junior Engineer in quality control and testing activities of computer or microprocessor Based system.
iv) Junior Marketing Executive/Junior sales Executive/ Sale Engineer in Marketing activities.
v) Juniors Purchase Officer/Junior stores Officer in Commercial activities.
vi) Junior/Senior technical Assistant in R&D laboratories to help in the design & development of microprocessor/ microcomputer based products, in interfacing computers with peripherals & other products and in maintaining computers in house.

(b) **Self Employment:-**

1. Small-scale unit doing third-party servicing and maintenance of computer systems.
2. Small-Scale vendor computer cards, computer peripherals and electronic components and devices.

2. ACTIVITIES OF DIPLOMA HOLDERS IN COMPUTER ENGINEERING

Following are the activities performed by a Diploma holders:

(a) Service Engineer/Customer Engineer/ Junior Service Engineer /Maintenance Engineer:-

- Identify hardware and software faults and rectify them.
- Rectify faults and components at card level.
- Advise customers on site preparation and check the same
- Install the systems and check its Operations
- Train customers in Operation and use of systems
- Do preventive maintenance at customer site as per maintenance schedule
- Negotiate, collect annual maintenance contracts
- Suggest desirable changes in the design, in view of maintenance experiences.
- Keep Maintenance Logs.

(b) Assembly Supervisor/Shop floor Manager:-

- Indent the material from storage and schedule the work of skilled worker.
- Guide skilled workers in component identification, testing and assembly work.
- Fabricate (If required), test and interconnect different sub-assemblies and sub-systems.
- Manage technicians and skilled workers.

(c) Technical Assistant/Junior Engineer (Quality Control)

- Collect samples of goods produced
- Inspect incoming components for quality standard
- Do Visual inspection, run software diagnostics and test the hardware of finished goods like peripherals computer system/microprocessor based systems and embedded systems.
- Do statistical analysis on the data and report.

(d) Junior/Senior Technical Assistant (R&D)

- Identify hardware & software faults & rectify them
- Rectify faults at component & card level.
- Install the HW & SW and tests them.
- Do preventive maintenance.
- Interface computer/microprocessors to different real time devices.
- Fabricate & test cards to be used in microprocessor/computer based system.
- Design & develops small hardware/software under the guidance of senior technologist.

(e) Junior Marketing Executive/Junior Sales Executive

- Collect and fill tender notices
- Meet prospective customers along with sales engineer.
- Arrange demonstration at site of customers.

(f) Junior Purchase Officer/Junior Stores Officer

- Write specifications, receive quotation, prepare & check comparative statements, checks bills.
- Prepares bills for service charges and cost of materials
- Do incoming inspection (Check quality, quantity and specification of material supplied against orders)
- Maintain stocks and records.

(g) Small-Scale Unit doing third party maintenance Activities are same as given in (a) above.

- Small-scale vendor of computer cards, peripherals, electronic components and devices Activities are same as given in (d) and (e) above.

3. **OBJECTIVE OF THE COURSE:-** The course provides necessary knowledge and skill in

1. Installing computer system and software.
2. Trouble shooting and maintaining computer system, microprocessor based systems, digital systems and computer peripherals at chip, card & system level.
3. Interfacing peripherals with computer systems
4. Testing computer system
5. Understanding the working of computers, microprocessor based systems, peripherals and various software like operating systems.
6. Writing computer program in high level languages and in assembly language.
7. Understanding the system program given in source code and modify & maintain them with some guidance.
8. Understanding the process of fabrication of PCBs and the computer system.
9. Preparing reports, manuals for users & technical persons regarding the operation of equipment and projects.

10. Operating computer systems and popular software package.
11. Preparing environmental specification for site, testing the provisions on the site and supervise their provision.
12. Preparing specification for computer systems, evaluating the specification and testing computer system for specification.
13. Developing diagnostic test programmes and test hardware.
14. Designing, fabricating & testing digital and microprocessor based system under some guidance from senior engineer.
15. Modifying, maintaining small software subsystems.
16. Documenting different hardware & software systems for different target groups.
17. Understanding commercial processes of importance to the industry.
18. Understanding the basic concepts of networking and establish simple homogeneous local area net works for PC environment.

-*-*-*-

3. Competency Profile: Keeping in mind the job opportunities of diploma holders in Computer Engineering, the programme is aimed at developing following competencies in terms of knowledge and skill in the students:-

i) Knowledge about working of Computers and peripherals.

ii) Skills in Identifying Hardware and Software faults and rectify them.

iii) Skills in operating Computer Systems and various software packages.

iv) Understanding of database and knowledge of database management System.

v) Knowledge of principles of digital data transmission, communication methodologies, protocols and networking equipments used in data transmission.

vi) Knowledge of data structure and programming techniques.

vii) Knowledge and skills in installing Computer Systems and checking their operation.

viii) Understanding of basic concept of networking and establishing LAN/WAN for PC environment.

ix) Knowledge of web technologies and their application in various areas.

x) Skills in Development and execution of preventive maintenance schedule.

xi) Knowledge of principles of management and entrepreneurship to manage resources optimally.

xii) Development of Communication and interpersonal skill for effective functioning in the World of Work.

xiii) Understanding of Principles of Applied Sciences for developing scientific temper.

xiv) Knowledge of Microprocessor based system and embedded system

4. Deriving Curriculum Areas from Competency Profile: The following curriculum areas have been derived from competency profile:

Sr. No.	Competency Profile	Curriculum Areas
1.	Knowledge about working of Computers and peripherals.	- Computer Fundamentals - Peripherals and interface.
2.	Skills in Identifying Hardware and Software faults and rectify them and Development and execution of preventive maintenance schedule.	- Computer Assembly and Maintenance - Computer Workshop.
3.	Skills in operating Computer Systems and various software packages.	- Operating System - Computer Organization - Multimedia Computing - Computer Graphics
4.	Understanding of database and knowledge of database management System.	- Introduction to Data Base Management System
5.	Knowledge of principles of digital data transmission, communication methodologies, protocols and networking equipments used in data transmission.	- Data Communication and Network - Basic Electronics - Digital Electronics
6.	Knowledge of data structure and programming techniques.	- Data Structure Using C - Programming Techniques Using C - JAVA
7.	Knowledge and skills in installing Computer Systems and checking their operation.	- Computer System Architecture - System Analysis and Design
8.	Understanding of basic concept of networking and establishing LAN/WAN for PC environment.	- Computer Network - Network of Operating System
9.	Knowledge of web technologies and their application in various areas.	- Web Technology
10.	Knowledge of principles of management and entrepreneurship to manage resources optimally.	- Industrial Management
11.	Development of Communication and interpersonal skill for effective functioning in the World of Work.	- Communication skills - Language Laboratory
12.	Understanding of Principles of Applied Sciences for developing scientific temper.	- Applied Physics - Applied Mathematics
13.	Knowledge of Microprocessor based system and embedded system	- Introduction to Microprocessors - Microprocessor based system design and interfaces

STUDY EVALUATION SCHEME

1st Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
X-101	English and communication Techniques – I	4	-	-	25	-	75	3	-	-	**100**
X-102	Applied Mathematics-I	5	-	-	25	-	75	3	-	-	**100**
YZ-103	Applied Physics-I	3	-	2	15	10	75	3	25	3	**125**
Y-104	Computer Fundamentals	2	-	3	15	10	75	3	25	3	**125**
Y-105	Engineering Drawing	-	-	6	-	25	75	4	-	-	**100**
Y-106	Basic Electricity – I	3	-	2	15	10	75	3	25	3	**125**
Y-107	Workshop Practice- I	-	-	8	-	50	-	-	50	3	**100**
Total		**17**	**-**	**21**	**95**	**105**	**450**	**19**	**125**	**12**	**775**

2nd Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
X-201	English& Communication Techniques –II	4	-	-	25	-	75	3	-	-	**100**
X-202	Applied Mathematics-II	5	-	-	25	-	75	3	-	-	**100**
YZ-203	Applied Physics- II	3	-	2	15	10	75	3	25	3	**125**
Y-204	Basic Electricity –II	3	-	2	15	10	75	3	25	3	**125**
Y-205	Programming Technique Using C	4	-	2	15	10	75	3	50	3	**150**
Y-206	Basic Electronics	3	-	2	15	10	75	3	25	3	**125**
Y-207	Workshop Practice -II	-	-	6	-	50	-	-	50	3	**100**
Total		**22**	**-**	**14**	**110**	**90**	**450**	**18**	**175**	**15**	**825**

3rd Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
K-303	Peripheral and Interfaces	4	-	2	15	10	75	3	25	3	125
Y-304	Digital Electronics	4	-	3	25	25	75	3	50	3	175
KI-301	Data Communication & network	4	-	3	15	10	75	3	50	3	150
K-305	Computer Organization	4	-	-	25	-	75	3	-	-	100
KI-302	Data Structure Using C	3	-	4	25	25	75	3	50	3	175
K-306	Computer Workshop	-	-	4	-	50	-	-	50	3	100
Total		**19**	**-**	**16**	**105**	**120**	**375**	**15**	**225**	**15**	**825**

4th Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
K-401	Computer Network	4	-	2	15	10	75	3	25	3	125
KNL-403	Introduction to Microprocessor	4	-	2	25	10	75	3	40	3	150
KI-402	Operating Systems	4	-	2	15	10	75	3	25	3	125
K-404	Computers Assembling & Maintenance	2	-	4	25	25	75	3	50	3	175
K-405	Introduction to Data Base Management System	4	-	4	15	10	75	3	50	3	150
K-406	Minor Project Work	-	-	4	-	50	-	-	50	3	100
K-407	Industrial Training										50
Total		**18**	**-**	**18**	**95**	**115**	**375**	**15**	**240**	**18**	**875**

Note:-*The Student should undergo Four Weeks Industrial Training during Summer vacation after completion of fourth semester*

5th Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
k-502	Microprocessor Based system Design and Interfaces	3	-	4	25	25	75	3	25	3	**150**
K-504	Computer System Architecture	4	-	2	25	25	75	3	25	3	**150**
KI-501	System Analysis & Design	4	-	-	25	-	75	3	-	-	**100**
K-505	Programming using Visual Basic	4	-	4	15	10	75	3	50	3	**150**
K-506	Language Laboratory	-	-	2	-	25	-	-	25	3	**50**
	Elective –I	4	-	4	25	25	75	3	25	3	**150**
KI-503 K-511	Network Operating System. Multimedia Computing										
Total		**19**	**-**	**16**	**90**	**110**	**375**	**15**	**125**	**15**	**750**

6th Semester Computer Engineering Study Evaluation Scheme

Paper Code	Subjects	L	T	P	EVALUATION SCHEME						TOTAL
					INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
					Theory Max. Marks	Pract. Max. Marks	Written Max. Marks	Time In Hrs.	Practical Max. Marks	Time In Hrs.	
1	2	3			4	5	6	7	8	9	10
K-601	Computer Graphics	4	-	4	15	10	75	3	50	3	**150**
K-602	OOPS with C + +	4	-	4	15	10	75	3	50	3	**150**
YZ-603	Industrial Management	4	-	-	25	-	75	3	-	-	**100**
	Elective–II	4	-	4	15	10	75	3	50	3	**150**
K-611 K-612 K-613	Web Technology Computer Based Instrumentation & Control Core Java										
K-604	Industrial Oriented Major Project Work	-	-	8	50	50	-	-	100	3	**200**
Total		**16**	**-**	**20**	**120**	**80**	**300**	**12**	**250**	**12**	**750**

Detailed Contents Of Various Subjects

x-101

ENGLISH AND COMMUNICATION TECHNIQUES-I

	L	T	P
Hrs/week	4	–	–
Max. Marks.	75		

RATIONALE:-

For a diploma holder joining industry or any organization, language remain the most important means of communication. Therefore, acquiring knowledge and skill in language in indispensable proficiency both in written & spoken language is required to be developed among the students of diploma course. Economic liberalization, privatization, and globalization of the India economy has put all the more stress on developing written and oral communication skill among the technician. More over English Language is de-factro international language. Keeping in view the above and continuing education needs of technicians and the availability of knowledge of the field of Science and Technology in English language only the workshop group suggested to effect the following improvement in the existing curricula of English in the first as well as second:-

1. **Prose Text Book**:- A Book English for Polytechnics(Prose Section) Fourth Revised Edition, prepared by T.T.T.I. Chandigarh. The following topics shall be covered in the first semester.
   (a) An Engineering Wizard
   (b) Subhash Chander Bose
   (c) God lives in the Panch
   (d) The Man who found penicillin
   (e) Guru Nanak
   (f) Sir J.C. Bose
   (*Simple short essay type question to be set in the examination and the students be asked to answer 5 of them*). (25 marks)
2. **Correspondence(Official, Business and Personal):-**
   One letter from each category may be set in the examination paper and the students be asked to write one of them. (10 marks)
3. **Grammar:**
   (i) Punctuation (5 marks)
   (ii) Conversion of direct narration into indirect form of narration direct-from of narration and vice versa). (5 marks)
   (iii) Transformation of tenses(simple to complex/compound and vice versa) (5 marks)
   (iv) Change of Voice (5 marks)
   (*Simple sentences to be set in the examination paper giving internal choice*).
4. **Translation**:
   From regional language/Hindi to English and vice-versa. A short paragraph of each type(at least 75 words) to be set in the examination. (5+5 = 10 marks)
5. **Essay Writing:-**
   Preferably on scientific topics from the given outlines. The paper setter may be instructed to give a choice of attempting one out of three topics. The question paper shall provide the outlines. The essay will be of 250 to 300 words. (10 marks)
   The examiner may select three topics one from each of the following fields:
   (a) Science
   (b) Technology and
   (c) General

6. Practice of Speaking in English Language by Organizing

(Not for Examination)

(i) Paper reading Contests
(ii) Discussion Sessions
(iii) Conduct of Seminar and current topics
(iv) Declamation contest.

Internal Assessment: Internal sessional marks shall be given out of 25 Marks

Applied Mathematics - I

	L	T	P
Hrs/week	5	–	–
Max. Marks.	75		

RATIONALE:-

Applied Mathematic form the backbone engineering students Basic element o algebra trigonometry coordinate geometry differentia calculus an integer calculus have been include the curriculum a foundation course and to provide continuing education base to the students.

DETAILED CONTENTS

I. Algebra

1.1 **Progressions**: Arithmetic progression, its nth term suit to n term with their application to engineering problems. Geometrical progression it nth term and sum to n terms and to infinity with application to engineering problems.

1.2 **Binomial Theorem:** Binomial Theorem(without proof for positive integral index(expansion and general term). Binomial theorem for any index(expansion only). First and second binomial approximation with application to engineering problems.

1.3 **Complex Numbers**: Complex numbers, rectangular, polar and exponential forms conversion from one form to another Argand diagram, addition, subtraction, multiplication and division of complex numbers.

2. Trigonometry:-

Sum difference formula and application(without proof) Product formulae (from product sum difference and vice versa). Ratio multiple angles submultiples angle(2A 3A A/2).

Statement of cosine formula, sine formula, Napier' analogy, Solution of triangles.

3. Co-ordinate Geometry:-

3.1 **Point**: -Cartesian coordinates polar coordinates and their conversion to Cartesian coordinate an vice versa (In two dimension only).

- Distance between two points Internal and External division formulae.
- Area of a triangle when its vertices are given condition of co linearity of points. To find the coordinate of centroid, incentre of triangle given the vertices using the formula. Simple problems on locus.

3.2 **Straight line:**

Equation of straight line in various standard forms. Inter section of two straight lines angle between two lines Perpendicular distance formula.

3.3 **Circle:-**

General equation of circle and its characteristics. To find the equation of circle given (i) Center and radius (ii) Three point on it(iii) Co-ordinate of end point of a diameter.

3.4 **Conic Section**:-

Definition of conic section. Standard equation of Parabola. Equation of parabola given its focus and directrix. Given the equation of a parabola, determination of its focus, vertex, axis, directrix and latus rectum.

Ellipse and hyperbola (standard equations without proof), Writing equations given the directrix, focus and eccentricity, give the equation determination of its focus directrix, latus rectum axes, eccentricity and vertex.

4. Differential Calculus

4.1 *Function and Limits*

Concept of function it value and limit Evaluation of limit in case of focus standard limits.

$$\lim_{x \to} \frac{\sin(X)}{X} \qquad \lim_{x \to 0} (1+x)^{1/x} \qquad \lim_{x \to} \frac{x^n - a^n}{x-a}$$

$$\lim_{x \to} \frac{a^x - 1}{x}$$

4.2 **Differentiation**

- Definition, its physical meaning as a rate measure and its geometrical meaning as slope.
- Differentiation fro firs principle of x^n a^x log x, sin x,cos x tan x.
- Differentiation of sum product and quotient of functions.
- Differentiation of function of a function.
- Differentiation of sec x, cosec x, cot x and of inverse t-ratios.
- Differentiation of implicit function and parametric equations.
- Logarithmic differentiation's.

4.3 *Applications*

Rate measure of Differentiation: Errors, maximum and minimum, tangent and normal.

5. Integral Calculus

5.1 *Indefinite Integrals*:

Integration as inverse process of differentiation. Simple integration by substitution, by parts and by partial fraction.

Applied Physics-I

L T P
Hrs/week 3 - 2
Max. Marks. 75

RATIONALE:-

Applied Physics is a foundation course. It purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. The course cover basic like Mechanics, Heat, Waves, Sound, Light, Electrostatics and Electromagnetism. While teaching the subject teacher should make maximum use of engineering applications to make the subject interesting to the students.

DETAILED CONTENTS

1. **Unit and Dimensions**:-

   Fundamental and derived units in S.I. System, Dimensions of physical quantities. Principle of homogeneity. Dimensional equations. Application of dimensional analysis:

   a) Checking the correctness of physical equations.
   b) Derivation of simple physical relations, and
   c) Conversion of units. Limitation of dimensional analysis.

   Error in measurement of accuracy, estimation of percentage error in the result of measurement.

2. **Force and Motions**:-

   i) Scalar and vector quantities with Examples.
   ii) Force and its units(in S.I) addition of forces.
   iii) Resolution of forces into rectangular components.(Simple problems).
   iv) Composition of force by parallelogram law.
   v) Parabolic motion. Horizontal projection and projection at a angle, time of flight horizontal range and maximum horizontal range Simple problems.
   vi) Angular frequency, angular velocity, relation between linear and angular velocity, angular acceleration, centripetal acceleration centripetal and centrifugal forces. Application to banking of roads.

3. **Work Power and Energy**:-

   Work and its units. Work done on bodies moving on horizontal and inclined planes. Concept of power and its unit Calculation of power(simple cases). Concept of kinetic energy and potential energy Expression for P.E and K.E. Conservation of energy in the case of freely falling bodies Principle of conservation of energy ,Energy mass relationship.

4. **Rotational Motion**:-

   Rigid body, Moment of inertia. Torque and angular momentum and their and their inter-relation Application of conservation of angular momentum. Kinetic energy of rotation. Rolling as combination of rotation and translation.

5. **Simple Harmonic Motion:**

   S.H.M.-derivation of equation of displacement, velocity, acceleration, time period and frequency of a body executing SHM. Free, forced and resonant vibration(No derivation). Example: Spring mass system: LCR Circuit, Simple Pendulum.

6. **Temperature and its Measurement**:-

Concept of heat and temperature on the basis of K.E. of molecules. Unit of heat. Basic Principles of measurement of temperature, (Thermo Couple, thermo-meters. Bimetallic and resistance). Ranges of these thermometer. Criteria for the selection of a thermometer.

7. **Heat Transfer**:-

Three modes of transfer of heat. Certificate of thermal conductivity, its determination by Searle's method and Lee's disc method. Conduction through compound media(series and parallel for two material only), Radiation. Characteristics of heat radiation. Emissivity and absorptivity. Kirchoff's Law. Stefan's Law of radiation.

8. **Modern Physics**:-

Atomic Model, Bohr's model and its shortcoming, X rays: production characteristics and uses of X rays, Laser: Spontaneous emission, stimulated emission, population emission, properties of lasers and application.

9. **Radioactivity**:-

Natural Radio activity, half life, average life, radio active transformation, binding energy and neculear stability, principles of nuclear stability, principles of nuclear fission and fusion, energy generation in reactors(qualitative only).

List of Experiments

1. To determine the density of a cylinder using vernier calipers and balance.
2. To determine the area of cross section of a wire using screw gauge.
3. To determine the thickness of glass piece using spherometer.
4. Calculation and verification of period of vibrations of a cantilever(Use graph).
5. Calibration of a thermometer.
6. Measurement of centripetal force.
7. Measurement of K.E. gained by a body dropped through a height h.
8. Measurement of coefficient of thermal expansion.
9. To find surface tension of water by capillary tube method.
10. To study the forced vibration and resonance-by-resonance apparatus.

Y-104

COMPUTER FUNDAMENTALS

	L	T	P
Hrs/week	2	–	3
Max. Marks. 75			

RATIONALE:

A polytechnic pass out is supposed to have good knowledge of Computer Science so that execution job can be undertaken. He is also required to understand and interpret the DOS and WINDOW environment and MS-OFFICE. He should be familiar with the different types of computers. The design of the curricula of this subject is done keeping in view the above requirements.

DETAILED CONTENTS

1. **Familiarization with Computer Hardware:**
   - 1.1 Block diagram of a computer System & its working.
   - 1.2 Various Input/Output devices of Computer System.
   - 1.3 Memory (Primary & Secondary)
   - 1.4 Types of Computer: Micro (PC, PC-XT, PC-AT), Mini, Mainframe & Super Computer & their Capabilities.
   - 1.5 Interconnecting various external units including Computers.
2. **Familiarization with Computer Software:**
   - 2.1 Introduction to Operating System & its importance.
   - 2.2 Type of Software (System Software, Application Software)
   - 2.3 Terminology: Compiler, Interpreter, Assembler, Loader, Linker, Programming Languages.
   - 2.4 Booting a computer system (cold Boot & Warm Boot)
   - 2.5 Introduction to file & directories.
3. **Introduction to DOS:**
   - 3.1 Internal & External Dos Command.
   - 3.2 Creating & working with files & directories.
   - 3.3 Formatting Floppies & Hard disks.
   - 3.4 File Operations: Copying, Renaming, Deleting, Printing
4. **Introduction to Windows:**
   - 4.1 Graphical User Interface.
   - 4.2 Common GUI Terms:
     - (a) Pointing Device(Use of mouse & its function)
     - (b) Menu Bar, Pull-down menu, Pop-up menu.
     - (c) Dialog Boxes, button, sliders, check boxes
     - (d) Icon (Shortcuts, Folders)
   - 4.3 MS-Windows:
     - (a) Benefits of Windows.
     - (b) Structure of a Window.
     - (c) Basic Techniques for working in windows.
     - (d) Icon(Shortcuts, Folders)

4.4 Starting Windows XX.X
   a. Task Bar
   b. Start Menus
   c. Shortcuts Menus
   d. Shut Down

4.5 Management System in Windows:
   (a) My Computer
   (b) Backup your data
   (c) DOS prompt

4.6 File & Folder:
   (1) Windows Explorer
   (2) Various files operations(File Naming, Finding, Creating, Copy/Move, Deleting)
   (3) Various folder Operations(Folder Creating, Renaming, Viewing)
   (4) Recycle Bin.

4.7 Working with MS-Word
   a. Various Operation on Documents (Such as Open, Print, Page Setup)
   b. Editing a document (Copy, Paste, Find, Replace)
   c. Document Alignment, Creating Bullets & number list
   d. Setting: Fonts, Size, Style
   e. Proofing Tools(Spell Checker & Checking Grammar)
   f. Formatting Paragraph(alignment, Line & Paragraph, Spacing, Border & Shading)
   g. Mail Merge on document.

4.8 Working with MS-EXCEL
   1. Creating a Worksheet
   2. Editing (Typing Data, Coping, Moving)
   3. Using various formula in worksheet.
   4. Creating various type of graphs.
   5. Printing worksheet.

LIST OF PRACTICALS

1. Familiarization with PC, Connecting & disconnection Keyboard, Monitor, Printer, Correct methods of handling of floppies & mouse.
2. Practicing on Window XX.X(Creating shortcuts, folder, file, note pad, paint program etc.)
3. Creating MS-Documents & Practicing with its tools(Font, Size, Creating Table, Mail Merge)
4. Creating Worksheet, Table & Graph.
5. Practicing on Internet.

Y-105
Engineering Drawing

L T P

Hrs/week - - 6
Max. Marks. 75

RATIONALE:-

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings their reading and interpretation. The emphasis while imparting instructions should be to develop conceptual skills in the students.

Note:- 1) First Angle Projection to be followed.
2) Minimum of 12 sheets to be prepared by each student.
3) BIS SP 46-1988 should be followed.

DETAILED CONTENTS

1. **Handling, Use and Care of Drawing Instruments and Materials.**
   - 1.1 Drawing Instruments
   - 1.2 Layout of drawing sheets

2. **Different Type of Lines and Free Hand Sketching.**
   - 2.1 Different types of lines in Engineering drawing as per ISI specifications.
   - 2.2 Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles and circles.

3. **Lettering Technique and Practice**
   - 3.1 Instrumental single stroke lettering of 35 mm and 70mm height in the ratio of 7:4.
   - 3.2 Free hand lettering (Alphabet and numerals)- lower case and upper case, single stroke and block letter, vertical and inclined at 75 degree in different standard series of 2.5, 3.5, 5,7,10,14 and 20mm heights in the ratio of 7:4.

4. **Dimensioning Technique**
   - 4.1 Necessity of dimensioning, methods and principles of dimension (mainly theoretical instructions.)
   - 4.2 Dimensioning of : Overall sizes, Circles, threaded s, chamfered surfaces, angles, tapered surfaces, holes equally spaced on P.C.D., counter sank holes, counter bored holes, cylindrical parts, narrow spaces and gaps radii, curves and arches.

5. **Projection:-** Theory of projections (Elaborate theoretical instructions)
   - 5.1 Introduction of first angle projections
   - 5.2 Drawing 3 views of given objects (at least 2 objects)
   - 5.3 Drawing 6 views of given objects (Non symmetrical objects may be selected for this exercise).
   - 5.4 Sketching practice of pictorial views from objects.

6. **Sections**:-
   - 6.1 Importance and salient features, methods, of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning.

6.2 Drawing of full section, half section, partial or broken out sections, offset sections, revolved sections and removed sections. Exercises on sectional views of different objects.

6.3 Drawing of different conventions for material in section. Conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections.

7. **Isometric Views:-**

7.1 Fundamentals of Isometric Projections (Theoretical instructions).

7.2 Isometric views from 2 or 3 given orthographic views.

8. **Symbols and Conventions:-**

Electrical fitting symbols for domestic interior installations, electronics symbols & welding symbols.

9. Conventional representations of threads, specifications, nuts bolts, screw studs washers & their applications.

Y-106
BASIC ELECTRICTY-I

L T P

Hrs/week 3 - 2
Max. Marks. 75

RATIONALE:-

The Course provided the students:

Understanding the basic concepts and principles of DC and AC power, Familiarization with basic electrical circuits and devices. Understanding the principles of working of various testing and measuring instruments and their effective use.

DETAILED CONTENTS

1. **Review of following:**
   - 1.1 Coulomb's Law, Electric field, Electric intensity, Electric Lines of force in simple charge configuration.
   - 1.2 Gauss's theorem(No Proof), Field around a charged displacement current and displacement density.
   - 1.3 Concepts of potential difference, potential due to a point charge, equipotential surfaces, units of potential difference.

2. **Capacitor:**
   - 2.1 Concepts of capacitance and capacitors, Units of Capacitance, capacitor ratings.
   - 2.2 Parallel plate, spherical and cylindrical capacitors and their capacities.
   - 2.3 Energy stored in capacitor.
   - 2.4 Concept of dielectric and its effect on capacitance: dielectric constant, dielectric breakup.
   - 2.5 Series and parallel combination of capacitors. Simple problems of capacitors.

3. **D.C. Circuits:**
   - 3.1 Concept and units of electric current.
   - 3.2 Ohm's Law, Concepts of resistance, conductance, resistivity and conductivity. Their units and dependence on temperature in conductor.
   - 3.3 Power and Energy, heating effect of electric current and conversion of mechanical to electrical units and vice versa.
   - 3.4 Kirchoff's Voltage and Current Laws and their applications in simple D.C. circuits.
   - 3.5 Series and Parallel combination of resistors, Wattage consideration, Simple Problems.

4. **Basic Magnetism**:

   Magnetic Intensity and magnetic flux and their units. Intensity of magnetization, retentivity, hysterisia, hysteresis loop.

5. **Electromagnetism:**
   - 5.1 Concept of magnetic field production by flow of Current. Oersted's experiment, concept of magentomotive force(MMF), flux, reluctance, permeability, Analogy between electric and magnetic circuits.
   - 5.2 Force of a moving charge and current in magnetic fields. Force between two current carrying parallel conductors.
   - 5.3 Magnetic fields around a current starignt conductors circular loop and solenoids.
   - 5.4 Faraday's Laws, Lenz's Law and rules of electromagnetic induction, principles of self and mutual induction, self and mutually induced e.m.f., simple numerical problems.
   - 5.5 Energy stored in a magnetic fields, concept of current growth, decay and time constant in an inductive(RL) circuits.

5.6 Energy stored in an inductor, series and parallel combinations of inductors.

6. **A.C. Theory:**

6.1 Concept of alternating voltage and current, difference between A.C. and D.C.
6.2 Concept of cycle, frequency period, amplitude, instantaneous value, average value, rms value and peak value. Form factor(definition Only).
6.3 Representation of sinusoidal quantities by phasor diagram.
6.4 Physically concept and Phasor diagram of alternating voltage capacitance, Phasor Diagram for simple R.L.C. circuits(Series & Parallel). Concept of impedance, impedance triangle, phase angle. Numerical problems, Phasor diagram for RL, RC series circuits.
6.5 Transient response of RL,RC & RLC circuits with initial conditions & Solution.

7. **A.C. Power in RLC Circuits**:

Power in Pure resistance, inductance and capacitance, power in combination of R,L,C Circuits, power factor, active and reactive currents and their significance, practical importance of power factor.

8. **Resonance of RLC Circuits:**

Series and Parallel resonance in RLC circuits, Q of a Coil, a capacitor and a tank circuit. Band width of resonant Circuits. Concept of Selectivity.

9. **Voltage and Current Sources:**

Concept of constant voltage and constant current sources, symbol and graphical representation, characteristics of ideal and practical sources.

10. **DC & AC Circuits Theorems:**

Thevenin's theorem, Nortron's theorem, superposition theorem, maximum power transfer theorem, application of network theorems in solving DC/AC circuits problems.

LIST OF EXPERIMENTS

1. Verification of Ohm's law.
2. (a) Verifications of Req= R1+R2+R3+…… in circuits, where are R1, R2,R3…….. are in series.
   (b) Verification of 1/Req= 1/R1+1/R2+……. In circuit where R1,R2…….. are in parallel.
3. Verification of Kirchoff's first and Second Laws.
4. To measure the(very low) resistance of ammeter and (very high) resistance of voltmeter.
5. To measure resistance of galvanometer by half deflection method.
6. Conversion of galvanometer into (i) Ammeter (ii) Voltmeter
7. To verify in DC circuits(i) Thevenins Theorem (ii) Nortron's theorems (iii) Superposition theorem (iv) maximum power transfer theorem.
8. To verify in DC Circuits (i) Superposition theorem (ii) Power transfer theorem.
9. To measure inductance of ferrite core by first removing the core then by inserting the core gradually to the full extent and observe the effect of flux concentration on value of inductance.
10. (a) To verify Leg= L1+L2+…where inductance L1,L2….are connected in series

    (b) To verify Leg= L1+L2+…… where inductance L1,L2….are connected in Parallel.
11. To measure capacitance of tuning capacitor by gradually tuning the plates inside one another and to observe effect of different overlaps.
12. (a) To verify Ceq= C1 + C2+……. where capacitance C1, C2…. are

connected in Parallel.

(b) To verify 1/Ceq= 1/C1 + 1/C2+…… where capacitance C1, C2…. Are connected in series.

13. Plot current and voltage growth and decay in RL and RC circuits for different time constants.

L	T	P
-	-	8
-	-	6

Y-107

Workshop Practice-I
Y-207
Workshop Practice –II

RATIONALE:-

This subject is gateway to the technology/industrial processes. The mental and manual abilities will be developed to handle engineering materials with hand tools with quality and safety consciousness. The elementary abilities developed in carpentry, fitting, sheet metal and jointing shops earlier and in electric and electronics shops during this study will find applications in other subjects. The emphasis given on practical work will provide the students the primary experience of working in team.

DETAILED CONTENTS

Workshops to be taught in both the semester simultaneously. 50% jobs to be performed in 1st Semester & remaining 50% in second semester.

1. Carpentry
2. Fitting
3. Sheet Metal and Jointing
4. Electrical Shop
5. Machine Shop
6. Electronic Shop

1. CARPENTRY SHOP

Keeping in view the essential elements of knowledge and skill, the following exercises are planned:

1. Introduction to raw materials, various hand tools and safety measures to be observed.
2. Exercise off Marking and Sawing.
3. Planning Practice
4. Chiseling practice
5. Introduction of joints, their relative advantage and uses.
6. Preparing of half lap joint
7. Preparing of mortise and tennon joint.
8. Preparation of dovetail joint.
9. Preparation of maitre joint.
10. Demonstration job showing use of rip saw, bow saw and trammel.
11. Demonstration of job on band saw, circular saw.

2. FITTING SHOP

1. Common materials used in fitting shop and description of work bench, holding devices and files.
2. Filling practice (production of flat surfaces). Checking by straight edge.
3. Filling a dimensioned rectangular or square piece to an accuracy of +- 0.25 mm.
4. Description of chisels, hammers etc. and chipping practice.

5. Simple operation of hacks awing, description of various types of blades, their uses and how to fit the blade and Hacks awing practice.
6. Description of drills, selection of drills for tapping, types of taps, tapping and dieing operations.
7. Drilling practice on soft metals (AI, Brass and lead).
8. Handling of measuring instruments, checking of zero error, finding of least count etc.
9. Practice of filing on non ferrous metal.

3. SHEET METAL & JOINTING SHOP

1. Introduction to sheet metal shop, use of hand tools and accessories, e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowances required during job fabrication. Selection of material.
2. Demonstration of the use of hand shears, sheet metal machines, creasing and grooving tools.
3. Preparation of a sheet metal job involving rolling, shearing, creasing, binding, corner making and round cutting.
4. Preparation of a sheet metal jobs involving shearing, grooving, greasing, circle cutting folding beading, etc.
5. Different types of rivets and their applications. Use of puncher and pullers.
6. Practice of riveting in different fashion e.g. lap, butt, chain, zigzag etc.
7. Preparation of utility jobs.
8. Introduction of soldering and brazing and; Demonstration on brazing by the Instructor.
9. Exercise on Spot Welding.

4. ELECTRICAL SHOP

1. Electrical safety Rules. During the first session all students must learn important safety rules, precautions and measures against fire hazards due to Electrical fault and treatment against electric shock.
2. Identification of commonly used electrical engineering materials. During these turns students must learn about different types of insulators, conductors (types of wires, cables etc.) and magnetic materials. They should be shown these materials in Electrical workshop and also told the typical applications.
3. Familiarization with Domestic Wiring: Some simple exercises should be done by students in the electrical workshop. Three such exercises are given below:
    a) Wiring of a mains outlet panel consisting of a specified combination of 5 amp, 15 amp sockets, mains switch, indicator lamps and fuse links.
    b) Wire a fluorescent lamp to AC main along with the switch, indicator lamps and fuse links.
    c) Wire a door bell.

4. Study of demonstration board, showing complete wiring of a house in (i) batten wiring (ii) plastic casing and capping.

5. Study and testing of common electrical appliances such as electric irons, electric kettles, water heaters, table fans and mixy and rectification of simulated faults.

6. Charging a battery and testing it with the help of hydrometers and Cell testers and study of battery connection in series and parallel.

7. Laying out 3 phase wiring for an electric motor/any other 3 phase machine.

8. Connecting a single phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.

9. Checking continuity of connection (With tester and bulbs) location of faults (With a megger) and their rectification in simple machines and/or other electric circuits fitted with earthing.

10. Dismantling, Servicing and reassembling a table fan/ceiling fan/air cooler/ mixi/electric iron.

5. MACHINE SHOP

1. Demonstration of functioning of lathe machine with the help of dis-assembled lathe, the names of different parts of machine. Lathe operations and safety measures and practice in the starting and stopping of the machine.

2. Practical demonstration by instructor : Holding the round bar, facing at one end, centring and rough turning.

3. Simple exercise on plain and step turning.

4. Taper turning by various methods.

5. Cutting simple threads and knurling.

6. Shaping machine: simple exercise on shaping machine.

7. Milling machine: simple exercise as gear cutting and rack cutting.

8. Drilling: simple exercise on drilling machine.

9. Grinding: face grinding and surface grinding.

6. ELECTRONIC SHOP

1. Identification of different types of resistors, capacitors and tools used in electronic workshop, study of colour code.
2. Identification and familiarization with the following electronic instruments:
   a) Multimeter digital (Three and Half digit)
   b) Single beam simple CRO function of every knob on the front panel.
   c) Audio-oscillator sine and square wave output.
   d) Power supply fixed voltage and variable voltage, single output as well as dual output.
3. Practice in the use of above mentioned equipment. A small experiment may be done for familiarization of the above.
4. Identification and familiarization with commonly used tools; statement of their uses. Identification and familiarization with active and passive components; colour code and types of resistor and potentiometers (including VDR, LDR and thermistor); some small practical exercises on measurement of these components; identification of diode and transistor terminals. Identification of other

components including LED, LCD, UJT, FET, coils, relays, transformers (mains, audio and RF, etc.) Linear and Digital ICs, Thyristors, etc.

Note: *Demonstration Boards for the above components should be made.*

5. Cutstrip, join and insulate two length of wires/cables (repeat with different types of cables/wires).
6. Cut, strip, connect/solders/crimp different kinds of wires/cables (including shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sock etc. jacks, terminals, binding posts, terminals strips, connectors. The tasks should include making complete recording/playback/Antenna/Speaker leads for common consumer electronic products such as Radio, TV, VCR, Cassette Recorder, Hi-Fi equipment, Head set, microphone.
7. Cut, bend tin components, insert and solder components (resistor, capacitor, diodes, transistors, IFT type coils, DIL ICs etc.) on a PCB.
8. Wiring of a small circuit on a PCB/tag strip tag strips involving lacking, sleeving and use of identifier tags.
9. Desolder, remove and clean all the components, wires from a given equipment, APCB or a tap strip.
10. Soldering Iron
11. Temperature Control Soldering Iron.
12. Desoldering pump
13. Desoldering strip
14. Exposure to modern soldering and desoldering processes.
15. Field visits.
16. Demonstrate (or explain) the joining (or connecting) methods or/and mounting and dismanting and dismantling method as well as uses of the items mentioned below:
    (i) Various types of single, multi-cored insulated screened pour, Audio video general purpose wires/cables.
    (ii) Various types of plugs, sockets, connectors suitable for general purpose audio video use. Some of such connectors area: 2 and 3 pin mains plug and sockets. Banana plugs, and sockets BNG, RCA, DIN, UHF, Ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.
    (iii) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, band selector, multiway Master Mains Switch.
    (iv) Various types of protective devices such as : wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple miniature circuit breakers, over and under current relays.

17. Demonstrate the skill to make faultless solders joints.
18. Demonstrate the skill to remove components/wires by unsoldering.
19. Demonstrate the skill to assemble components on boards, chassis, tape strips.
20 Explain (or demonstrate) various methods of making and laying of cable forms, wiring techniques.

Practical Work

1. Solder materials, fluxes and soldering iron, method of soldering, defect in soldering, Precautions in soldering, Proactive in component soldering and earthing.
2. Designing the PCB layout for simple electronic circuit.
3. Making the PCB- the artwork, fitting of components. completing above circuit. Testing the circuit and correction, if any, for proper functioning.
4. Tube cutting, flaring, bending, sealing, fitting of connectors, making joints and testing for leakage.
5. Study of filling materials study and sketch of washers, gasket, Dismantling a pneumatic control value. Study of different components. Cleaning assembly and checking for proper functioning and calibration.
6. Making three different thermocouples and their testing.
7. Study of indicator and recorder components in indicating-cum-recording unit. Their functions and setting.
8. Study testing and setting of a pressure.
9. Making a panel for a given circuit.
10. Connecting the instruments and devices for a circuit on a panel.

X-201

ENGLISH AND COMMUNICATION TECHNIQUES-II

L T P
Hrs/week 4 - -

RATIONALE:-

For a diploma holder joining industry or any organization, language remain the most important means of communication. Therefore, acquiring knowledge and skill in language in indispensable proficiency both in written & spoken language is required to be developed among the students of diploma course. Economic liberalization, privatization, and globalization of the India economy has put all the more stress on developing written and oral communication skill among the technician. More over English Language is de-factro international language. Keeping in view the above and continuing education needs of technicians and the availability of knowledge of the field of Science and Technology in English language only the workshop group suggested to effect the following improvement in the existing curricula of English in the first as well as second:-

1. **Text Book**:- "All My Sons" written by Arthur Miller Published by Konark Publishers Pvt. Ltd. New Delhi.
   (*Four simple short essay type question to be asked on characterization theme, moral etc. and one question on reference to the context giving internal choice in the examination*).

2. **Report Writing**:-
   Report writing from given out line. A choice to attempt one out of three to be given in the examination.

3. **Precise and Comprehension:-**
   An unseen passage of about 100 to 120 words to be given in examination. The passage selected should be such as easily lends itself to summarizing. In order to test comprehension a few question on the passage may be set.

4. Practice of writing personnel resume and Writing application for job/employment.

5. Effective Communication, Barriers to Communication.

6. One word substitution.

7. Pair of words/words often confused
   - Practice of Speaking English
   - Internal sessional marks shall be given out of 25 marks.

X–202
Applied Mathematics-II

L T P
Hrs/week 5 - -
Max. Marks. 75

RATIONALE:-

Applied Mathematics forms the backbone of engineering students Basic element of integral calculus, differential equation, Fourier Series, Vector Algebra, Determinant and Matrices and statistic have been included in the curriculum to provide continuing education base to the students.

DETAILED CONTENTS

1. **Integral Calculus:**
   1.1 Definite Integrals
   Evaluation of definite integral (simple problems) evaluation of

$$\int_0^{\pi/2} \sin^n x\,dx \qquad \int_0^{\pi/2} \cos^n x\,dx \text{ and } \int_0^{\pi/2} \sin^m x \cos^n x\,dx$$

(m,n being positive integer only)

   1.2 Applications
   Are bounded by curve and axes. Volume of solid formed by revolution of an area about axis. Mean and RMS Values.

   1.3 Simpson's Rule

2. **Differential equation:**
   2.1 Solution of Ist Order Differential Equation by:
      2.1.1 Variable separation
      2.1.2 Linear differentia equation o firs order

   2.2 Solution of second order linear differential equations having e^{ax}, sin ax, cos ax and x^n in the right hand side.

   2.3 Simple Applications

   2.4 Lap lace Transform and its applications to differential equations.

3 **Vector Algebra:**
   3.1 Definition notation and rectangular resolution of a vector.
   3.2 Addition and subtraction of vectors.
   3.3 Scalar and vector products of 2 vectors.
   3.4 Simple problems related to work, moment and angular velocity

4. **Determinant an Matrices**:-
   4.1 Determinants, minor, cofactor, expansion of determinant.
   4.2 Solution of equations by Cramer's rule.
   4.3 Definition and types of matrices
   4.4 Addition and subtraction of matrices, multiplication of matrices.
   4.5 Inverse of 3*3 matrix by ad joint method.
   4.6 Solution of linear equation containing upto 3 unknown only by matrix inversion.
   4.7 Solution of linear equations by Gauss method.

5. **Statistics**:-
   5.1 Organization and representation of data.

5.2 Mean and standard deviation.
5.3 Probability Laws conditional probability, Bey's theorem.
5.4 Binomial Poisson's and normal distribution and their application.
5.5 Drawing of control charts for Mean X, Range R, Proportion of defective p and number of defects c.

YZ-203
Applied Physics-II

L T P
Hrs/week 3 - 2

RATIONALE:-

Applied Physics is a foundation course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. The course cover topic like Waves, Acoustics', Ultrasonic, Electric fields, Capacitance, DC Current, Magnetic force and Magnetic field Electronic and Super conductivity. While teaching the subject teacher should make maximum use of demonstration to make the subject interesting to the students.

DETAILED CONTENTS

1. **Wave and Vibrations**:-
   - 1.1 Wave in matter, relationship between frequency, wavelength and velocity.
   - 1.2 Equation of wave.
   - 1.3 EM waves, EM spectrum, light
   - 1.4 Interference of waves
   - 1.5 Concept of diffraction of waves.
   - 1.6 Doppler effect in sound and light.

2. **Acoustics**:-

   Reflection, refraction and absorption of sound wave by materials, definition of pitch, loudness, quality and intensity of sound waves, unit of intensity(bel and decibel) Echo, reverberation and reverberation time. Control of reverberation time. Acoustics insulation (qualitative treatment only of reverberation)

3. **Ultrasonic**:-

   Production of ultrasonic wave by magnatostriction and piezoelectric effects, detection and properties of ultrasonic, application to drilling, cold welding, Cleaning flaw detection and exploration(Soner).

4. **Electric Fields**:-
   - Charge and conservation of charge, Coulomb's law, electric field and its intensity.
   - Electric line of force, lines of force in simple charge configurations, Gauss's, theorem, field intensity, around a charged straight conductor, plane sheet and a sphere.
   - Concept of potential difference, potential due to point charge equipotential surfaces.
   - Potential around a charged straight conductor, plane sheet and a sphere. Static Charges and their effects corona.
   - Electric dipole, concept of dipole moment.

5. **Capacitance**:-
   - Principle of a capacitor
   - Capacitance of parallel plate, spherical and cylindrical capacitors.
   - Energy stored in capacitor.
   - Dielectric constant and its influence of capacitance of capacitor, dielectric constant, dielectric breakdown and dielectric strength.
   - Charging and discharging characteristic of a capacitor.
   - Behaviors of capacitor in DC and AC circuits.
   - Equivalence capacitance, calculation for series and parallel combination capacity, variable capacitors.
6. Concept of electric current, resistance, resistivity, power dissipation, temperature coefficient of resistance.

7. **D. C. Current**:-

- Kirchoff's laws.
- Equivalent resistance in series and parallel arrangement of resistance

8. **Magnetic Field in Vacuum**:-
   - Magnetic field, flux, magnetic induction, unit of flux and induction magnetic field production by current and moving charges.
   - Ampere's theorem, Magnetic field produced by current carrying straight wire, circular loop and solenoids.

9. **Magnetic Forces**:-
   - Magnetic force on moving charges.
   - Trajectory of charge moving in a plane perpendicular to the magnetic field.
   - Half effect and its applications.
   - Motion of particles entering magnetic field at an angle of 90° to the field.
   - Interaction of currents with magnetic fields and force on current carrying straight conductor.
   - Force to the rectangular coil and principle of galvanometer.

10. **Varying Magnetic Fields**:-
   - Electro magnetic induction, Lenz's law and its relation with conservation of energy.
   - Concepts of self and mutual induction.
   - Dependence of inductance on core material.
   - Induced emfs on neighboring electrical lines due to signals on lines and the phenomenon of cross talk.
   - Summary of laws of electro-magnetism. Displacement current and associated magnetic fields, Maxwell's equations.

11. **Electronics:-**
   - Energy level and bonds, explanation of conductors, insulators and semi-conductors on energy band model. Expected differences between **GE** and **SI** based on band gap.
   - Intrinsic semiconductors, electrons and holes, electrons and hole currents, differences in motilities, recombination of electrons and holes, effect of temperature on semiconductors.
   - Extrinsic semiconductors-impurities, energy levels in band gap, differences in the electron and hole concentrations, electron and hole currents, effect of temperatures on extrinsic semiconductors, P and N materials.
   - PN junction formation and its behavior.
   - Working principles of LEDs photodiodes, laser diodes

12. **Super Conductivity**:-

    Introduction to critical temperature for known pure elements, introduction to type I and Type II super conductors, important application of super-conductivity

LIST OF EXPERIMENTS

1. Verification of Ohm's law.
2. Value of unknown resistance by wheat stone bridge.
3. To find the value of constant of galvanometer by half deflection method.
4. To verify series law of resistances and parallel law of resistances.
5. Conversion of galvanometer into ammeter.
6. Conversion of galvanometer into voltmeter.
7. Comparison of permeability of ferromagnetic materials using BH curve displayed on an oscilloscope or by plotting on graph sheet
8. Determination and investigation of the effect of RC time constant on charging and discharging of a capacitor in DC circuit.

Y-204
Basic Electricity-II

L T P

Hrs/week 3 - 2
Max. Marks. 75

RATIONALE:-

The nature of jobs an electronic technician has to perform varies widely. Any electronic system (i.e. tape recorder, VCR, TV receiver) is a combination of electronic circuits and electrical components (e.g. small electrical motor, different types of switches etc.) In order to carry out his job function effectively, apart from the knowledge and skills of electronics, he must posses sound knowledge about basic principles of working of electrical machines and equipment. The practical work done in this subject will help in developing skills of operating, repairing and testing of electrical machines and components (e.g. small electrical motor, transformer etc.)

DETAILED CONTENTS

1. **Measuring Instruments:**
   - 1.1 Working principles and construction of Ammeters and voltmeters (moving coil and moving iron type) .
   - 1.2 Difference between ammeter and voltmeter, extension of their range and simple numerical problems.
   - 1.3 Principle and working of:
   - Wattmeter (dynamo-meter type)
   - Energy meter (induction type)

2. **Generalized Treatment of Electrical Machines**:
   - 2.1 Introduction
   - 2.2 Definition of motor and generator
   - 2.3 Basic principle of a generator and a motor
   - 2.4 Torque due to alignment of two magnetic. Fields and the concept of Torque angle.
   - 2.5 Basic Electromagnetic laws.
   - 2.6 E. M. F. induced in a coil rotating in a magnetic field
   - 2.7 Elementary concept of an Electrical Machine
   - 2.8 Common features of rotating electrical machines.

3. **Three Phase Supply**:
   - 3.1 Advantage of three phase system over single phase system.
   - 3.2 Star Delta connections
   - 3.3 Relation between phase and line voltage single phase system and three phase system.
   - 3.4 Power and power factor in three phase system and their measurements.

4. **DC Machines:-**
   - 4.1 Main Constructional features, principle of working.
   - 4.2 Function of the commutator and motoring and generating action.
   - 4.3 Armature winding
   - 4.4 Factors determining induced e.m.f.
   - 4.5 Factors determining Electromagnetic torque
   - 4.6 Principles of generating and motoring
   - 4.7 Action and relationship between terminal voltage and induced e.m.f.
   - 4.8 Factors determining the speed of a DC motor
   - 4.9 Different types of a excitation.
     - 4.9.1. Performance and characteristics of different types of DC machines.
     - 4.9.2. Starting of DC machines, motors and starters
     - 4.9.3. Application of DC machines

5. **Transformer:-**
   - 5.1 Principles of operation and constructional details of single phase and three phase transformers. Core type and shell type transformers, difference between single phase and three phase transformers and advantages and disadvantage.
   - 5.2 Voltage Regulation of a transformer.
     - 5.2.1 Losses in a transformer.
     - 5.2.2 Efficiency, condition for maximum efficiency and all day efficiency.
     - 5.2.3 Auto transformers and instrument transformer.

6. **AC Motors:-**
   - 6.1 Brief introduction about three phase induction motors, its principles of operation.
   - 6.2 Types of induction motors and constructional features of squirrel cage and slip-ring motors.
   - 6.3 Starting and speed control: Star Delta and DOL (Direction-line) starters.
   - 6.4 Reversal of direction of rotation of 3 motors.
   - 6.5 Applications of induction motors.
   - 6.6 Introduction to synchronous motors and their applications.

7. **Single Phase and Fractional Kilowatt Motors:-**
   - 7.1 **Introduction:-**
     - 7.1.1 Principle of operation of single motors.
     - 7.1.2 Types of single phase induction motors and their constructional details (i.e. split phase, capacitor start, capacitor start and run, shaded pole and reluctance start)
   - 7.2 Single phase synchronous motors - reluctance motor (hysteresis motor) .
   - 7.3 Commutator type single phase motors - Repulsion Induction motor, shaded pole motors, AC series motor and universal motors.
   - 7.4 Introduction to servo-motors and stepper motors.

LIST OF PRACTICALS

1. Conversion of Galvanometer into Ammeter and Voltmeter.
2. To measure power and power factors in a 3 phase system with:-
   - 2.1 Balanced load
   - 2.2 unbalanced load by the two wattmeter method and any one other method.
3. To find the value of capacitance and power factor of a capacitor by approximate method.
4. To draw the equivalent circuit of a transformer and to determine efficiency and regulation by performing:
   - 4.1 Open circuit test
   - 4.2 Short circuit test
5. To measure the induced e.m.f. of a separately excited d.c. generator as a function of field current.
6. To measure the terminal voltage of a separately excited dc generator as a function of load current.
7. To measure the terminal voltage of a d.c. shunt generator as a function of load torque at rated armature voltage.
8. To measure the speed of a separately excited dc motor as a function of load torque at rated armature voltage.
9. To measure the speed of a separately excited dc motor as a function of load torque at rated armature voltage.
10. To measure the speed of a dc motor as a function of load torque at rated armature voltage.

11. To determine the efficiency of a dc shunt motor by the measurement of losses (Sunburn's method).
12. To observe the difference in the effect of switching on a single phase capacitor start induction motor with
    12.1 The capacitor disconnected and
    12.2 the capacitor connected. Also to determine how to reverse the direction of rotation.

Y–205
Programming Technique Using C

L T P

Hrs/week 4 - 2
Max. Marks. 75

Course Objective:-

This course provides the student with:

a) Understanding of Programming methodology for problem solving.
b) Programming skills in C.

DETAILED CONTENTS

1. **Programming Basics:-** Flowcharts, Algorithm, Problem solving concepts, top down and bottom design, structured programming and debugging techniques, program testing and documentation.

2. **Programming Language:** Program structure, Output functions, data type and identifiers assignment variables, arithmetic operators and precedence and input function, include statement. Some standard input/output functions, formatted input and output.

3. **Control Statement:** If-then-else, for, logical and relational operators, bitwise logical operators, Switch-case While, do-While, break, nested for.

4. **Functions:** Function declaration, parameter passing call by value and its implications, scope of variables, global and local variables, static variables.

5. **Arrays:** Single and multi-dimensional arrays, character arrays.

6. **Strings:** String and multi-dimensional arrays, character arrays.

7. **Pointers:** Pointer to various data types pointers in parameters passing, pointer to function, dynamic memory allocations, pointer arithmetic.

8. **Structure and Union:** Structure definition, pointer to structure, union.
9. **Files:**
   - Terminology connected with files organization serial, sequential, direct access, random indexed file organization, storage media and their suitability to different file organization, file creation, access and updation technique for each of these file organization.
   - File manipulation using standard functions.
   - Sorting technique and their algorithm, internal sorting technique-bubble sort, insertion sort, quick sort, merge sort.
   - Basic searching technique linear, binary search.
   - Merging technique- filed, record and file level merging with tape files.
   - Command Line arguments, macros, pre-processor directives.

LIST OF EXPERIMENTS

1. Editing and executing C Program.
2. Writing programs involving I/O statements.
3. Writing and executing programs with control structure
4. Problems on functions.
5. Problems on Arrays, pointers
6. Problems on Structure, Union etc.
7. Problems on string processing.
8. The Practice exercise may be given in the form of tutorial sheet and the students may test the solution on the Computer.
9. The student should have solved at least 50 exercise each ranging from 15 to 50 program statement.
10. The time allocated for the laboratory exercise are suggestive in nature and may depend upon the proficiency acquired on the student in various subtotals.

Y–206
BASIC ELECTRONICS

L T P
Hrs/week 3 - 2
Max. Marks. 75

RATIONALE:-

This Course provides the students with basic understanding of the principles of common electronic components and devices such as diodes, transistors, FETs and elementary circuits like amplifier circuits and the knowledge regarding the application of various circuits and devices. Practical experience in the fabrication and testing of circuits.

DETAILED CONTENTS

1. **Introduction**:- Introduction to active and passive components, passive components, fixed and variable resistors their various types and specializations including thermistors, LDR and VDR, fixed and variable capacitors, their various types and important specifications and colour codes.

2. **Semiconductor Physics**:- Intrinsic semiconductors - Conductivity, atomic and crystal structure of germanium and silicon, covalent bonds, generation and recombination, effect of temperature on conductivity of intrinsic semiconductors; energy level diagrams of conductor, insulator and intrinsic semiconductors. Extrinsic semiconductor materials - Doping of impurity, P and N type semiconductors and their conductivity. Minority and majority carriers; Drift and Diffusion currents.

3. **Semiconductor Diode:-** P-N junction diode, mechanism of current flow in P-N junction, drift and diffusion current, depletion layer, potential barrier, behaviour of P-N junction characteristics, zener and avalanche breakdown, concept of junction capacitance in forward and reverse bias conditions.

   Semiconductor diode characteristics, static and dynamic resistance and their calculation from diode characteristics Dynamics resistance of diode in terms of diode current.

   $$r_D = 25/I_D$$

   Diode (P-N junction) as rectifier, half wave rectifier, full wave rectifier including bridge rectifier, relationship between D.C. output voltage and A.C. input voltage, rectification efficiency and ripple factor for rectifier circuits, filter circuits : Shunt capacitor, series inductor, capacitor input, filter, bleeder resistance, physical explanations of the working of the filters and typical applications of each type. Different types of diodes; brief idea and typical applications of power diodes, zener diodes; varactor diodes and point contactdiode. Important specification of rectifier diode and zener diode.

4. **Introduction to Bipolar Transistor:-** Concept of bipolar transistor as two junction three terminal device having two kinds of current carriers; PNP and NPN transistors, their symbols and mechanisms of current, flow explanation of fundamental current relations.

   Concept of leakage current ICBO, effect of temperature on leakage current CB, CE and CC configurations. Common base configuration (CB): Input and output characteristics; determination of transistor parameter input and output dynamic resistance, current amplification factor. Common emitter configuration : current relations in CE configuration, collector current in terms of base current and leakage current (ICBO) relationship between the leakage current in CB and CE configuration input and output characteristics, determination of dynamic input and output resistances and current amplification factor(B) from the characteristics. Common collector configuration: expression of emitter current

in terms of the base current and leakage current in CC configuration. Comparison of CB and CE configuration with regard to dynamic input and output resistance, current gain and leakage current, preference of CE configuration over CB configuration. Transistor as an amplifier in CE configuration. DC load line, its equation and drawing it on collector characteristics. Determination of small signal voltage and current gain of a basic transistor amplifier using CE output characteristics and DC load line; concept of power gain as product of voltage gain and current gain.

5. **Transistor Biasing And Stabilization of Operating Point:-** Different transistor biasing circuits for fixing the operating point, temperature and' Bdc' on operating point, need for stabilization of operating point, effect of fixing operating point in cut off and saturation region for performance of the amplifier.

Calculation of operation point for different biasing circuits. Simple design problems on potential divider biasing circuit.

6. **Single Stage Transistor Amplifier**:- Single stage CE amplifier circuit with proper biasing Components, AC load line land its use in:
   - Calculation of current and voltage gain of a single amplifier circuit.
   - Explanation of phase reversal of the output voltage with respect to input voltage. Transistor hybrid low frequency model in CE configuration "h" parameters and their physical significance, typical values of the parameters.
   - Expressions for voltage gain, current gain, input and output impedance for a single stage CE Amplifier circuit in 'h' parameters, appropriate approximation.

7. **Field Effect Transistor(FET):-**
   - Construction, operation, characteristics and equivalent circuit of JFET and its circuit application.
   - Construction, operation, characteristics and equivalent circuit of MOSFET in depletion, enhancement modes and its circuit applications.
   - CMOS, advantages and applications.
   - Comparison of JFET, MOSFET, BJT
   - Simple FET amplifier circuit and its working principles without analysis).

LIST OF PRACTICALS

Practice in the use of following electronic instruments.

(a) Multimeter (analog/digital type).
(b) Regulated power supply.
(c) LF signal generator, CRO.

1. **Experiments to be Performed:-**
   i) Measurement of voltage at various settings (low and high voltages) of regulated power supply by using analog land digital multimeters.
   ii) Measurement of voltage and current by loading the regulated power supply.
   iii) To obtain various voltages like +15 V and measure them with the helf of analog and digital multimeter.
   iv) Practice in the use of signal generator land CRO : measurement of d.c. and a.c. voltage, time period/frequency of sine/square wave using triggered skweep CRO.

2. **Identification and familiarization of passive components. Experiments to be performed**:-

i) Measurement of resistors by an ordinary multimeter and an electronic multimeter and their verification on the basis of colour code & specification.
ii) Measurement of transformer turn ratio of a transformer and to note its specification.
iii) Note the variations in resistance by variation of :
a) light on LDR (b) temperature on a thermistor.

3. **Semiconductor Diode Characteristics:-**
i) Identification of type of packages, terminals and noting different ratings using data books for various type of semiconductor diodes (germanium point contact, silicon low power and high power and switching diode).
ii) Plotting of forward V-I characteristics for a junction P.N. diode (silicon and germanium diodes).

4. Rectifier circuits using semiconductor diode, measurement of input and output voltage and plotting of input and wave shape for:-
i) half wave rectifier
ii) full wave rectifier
iii) bridge rectifier diode circuits.

5. Plot forward and reverse V-I characteristics for a zener diode.

6. Plot the wave shapes of a full wave rectifier with shunt capacitor, weries inductor, and pie filter circuit.

7. Plotting input and output characteristics and calculation of parameters of a transistor in common emitter configuration.

8. Plotting input and output characteristics and calculation of parameters of a transistor in common emitter configuration.

9. Transistor biasing circuit. Measurement of operating point (IC and VCE) for:-
(a) fixed bias circuit.
(b) potential divider biasing circuit. (Measurement can be made by changing the transistor in the circuits by another of same type number).
10. Single stage common emitter amplifier circuit:-
(a) Measurement of voltage gain at l KHz for different load resistances.
(b) Measurement of input and output impedance of the amplifier circuit.
11. (a) Plot Plot the FET characteristics and determine the FET parameters from its characteristics.
(b) Measure voltage gain and plot the frequency response of JFET OR MOSFET amplifier circuit.

K-303
PERIPHERAL AND INTERFACES

L T P

Rationale

The course provides the necessary knowledge and skills regarding the working, construction and interfacing aspect of the peripherals. This subject provides the required background in teaching subjects of the computer maintenance, installation and testing of peripherals used with micro computers.

DETAILED CONTENTS

1. DISPLAY DEVICES : Overview of the raster scan, vector graphics, main differences and relative advantages. Elementary concepts regarding scanning and picture formation, video and sync signals. Timing & signal levels in monochrome and colour monitors. Concept of resolution and bandwidth of monitors. Explanation of the working of monochrome and the colour monitors with the help of block diagrams, RGB and composite video monitors, current standards in display technologies of PC - range of computers, (CGA, HGA, EGA, VGA).Architecture of colour graphic card. Basic concepts in regard to PAL & NTSC systems. Some latest monitors viz, flat monitor & TFT monitors, TV Tuner cards & video capturing card cards.

2. PRINTERS :- Type of printers - impact and non impact, printers specifications and characteristics. Construction and working of Dot Matrix printers including block diagram of electronic circuits, common faults in DMPs and their rectification. Inkjet printers, colour inkjet printers and their working, printer fonts. Construction and working of laser printers. Serial and parallel printers.

3. OTHER DEVICES :-Types of plotters, working principles and common faults of plotter. Working principle of Digitizer, Joystick, mouse, light pen and scanners Working principles, construction and interfacing of keyboards.

4. SECONDARY MEMORIES : FDD, Types of floppy drives, construction and working principles of FDD's. Block diagram and explanation of FDC. Formatting a floppy disk. Common faults in FDD including misalignment of R/W head and diagnosis of faults. Introduction to tape drives. HDD : Types of HDD's depending on size, actuators (voice coil and stepper motor drives), Drive parameters, disk formatting), Hard disk initialization and management, Drive partition table, disk head parking, hard disk controllers and types : depending upon encoding technique MFM, RLL, ERLL and type of interfaces ST-506 ESDI, SCSI and IDE, IRD ports USB ports sector interleaving, common faults of hard disks and diagnosis. Zip drives, pen drives, memory & his flash card memory.

5. Optical storage media - Construction and working principle of CD- ROM, Drives & CD –Writers & DVD drives.

6. Tape Drives : Types of tape drives and recording technology.

LIST OF PRACTICALS

Study the construction, assembly disassembly, working in & the testing of following devices.

1. Monitors (monochrome, colour, multisync)
2. Keyboards.
3. FDD
4. HDD
5. Dot matrix printers
6. Optical Disk Drives
7. Ink jet printers, laser printers
8. Plotters
9. Digitizer, Mouse & Scanner

Reference Books

1. Douglas Halls : Microprocessor & interfacing & Programming (McGraw Hills)
2. Lavis Hohonesteu : Computer peripherals for microcomputers, Microprocessor and PC.
3. Gulati : Colour television
4. Govindaraju : IBM PC and Clore
5. Bray : Microprocessor, interfacing & Programming
6. Krishna, J. : Understanding Hardisk management. - BPB publication
7. Win Rosch Bible : Hardware Bible
8. Uffenbeck : Microprocessor

Y-304
DIGITAL ELECTONICS

L T P
4 - 3

RATIONALE

This syllabus has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

DETAILED CONTENTS

1. Introduction:
   - 1.1 Basic difference between analog and digital signal.
   - 1.2 Applications and advantages of digital signals.

2. Number System:
   - 2.1 Binary and hexadecimal number system; conversion from decimal and hexadecimal to binary and vice-versa. BCD representation.
   - 2.1 Binary addition, subtraction, multiplication and division including binary points. BCD addition.1's and 2's complement method of addition/subtraction.

3. Logic Gates:
   - 3.1 Concept of negative and positive logic.
   - 3.2 Definition, symbols and truth table of NOT, AND,OR NAND, NOR EXOR Gates. NAND and NOR as universal gates.

4. Logic Simplification:
   - 4.1 Postulates of Boolean algebra, DC Morgan's Theorem. Various identities. formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equations with gates.
   - 4.2 Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits.

5. Logic Families:
   - 5.1 Logic family classification:
     - Definition of SSI, MSI, LSI, VLSI
     - TTL and MOS families & their sub classification.
     - Characteristics of TTL and MOS digital gates delay, speed, noise margin, logic levels, power dissipation, fan-in, fan-out, power supply requirement and compare son between TTL and MOS families.
     - Interfacing TTL and MOS ICs.
   - 5.2 Logic Circuits:
     - Open collector, wired OR and totem pole output circuit operation (qualitative) for a TTL NAND gate.
     - MOS circuit operation for a standard gate (NOR)
   - 5.3 Tristate Switch/Buffer

6. Codes and Parity
   - 6.1 Concept of code, weighted and non-weighted codes examples of 8421, BCD, excess-3 and grey code.
   - 6.2 Concept of parity, single and double parity and error detection
   - 6.3 Alphanumeric codes: ASCII and EBCDIC.

7. Arithmetic Circuits:
   - 7.1 Half adder and full adder circuit, design and implementation.
   - 7.2 Half and Full subtracter circuit, design and implementation.
   - 7.3 4 bit adder/subtracter.

8. Decodes, Display Devices and Associated Circuits:
   - 8.1 LED, LCD, seven segment display, basic, operation of various commonly used types.
   - 8.2 4 bit decoder circuits for 7 segment display and decoder/driver ICs.

9. Multiplexer and De-multiplexer:
   - 9.1 Basic functions and block diagram of MUX & DEMUX. Different Types.

10. Latches and Flip Flops:
   - 10.1 Concept and types of latch with their working and applications.
   - 10.2 Operation using waveforms and truth tables of RS,T, D, JK, Master/Slave JK flip flops.
   - 10.3 Difference between a latch and a flip flop

11. Counters:
   - 11.1 Binary counters
   - 11.2 Divide by N ripple counters (including design), Decade counter
   - 11.3 Presettable and programmable counters.
   - 11.4 Down counter, up/down counter
   - 11.5 Synchronous counters (only introduction)
   - 11.6 Difference between Asynchronous and Synchronous counters
   - 11.7 Ring counter with timing diagram

12. Shift Register
   - 12.1 Introduction and basic concepts including shift left and shift right.
   - 12.2 Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
   - 12.3 Universal shift register.
   - 12.4 Buffer register, Tristate Buffer register.

13. Memories:
   Basic RAM Cell, N x M bit RAM. Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM,EPROM and EEPROM.

14. A/D and D/A Converters:
   General principle of A/D and D/A conversion and brief idea of their applications. Binary register network and resistor ladder network methods of D/A conversion. Dual slope and successive approximation types in ADCs.

LIST OF PRACTICALS

1. AND, OR, NOT, NAND, NOR and EX-0R Ics Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EX-OR) gates.
2. Logic functions using Universal gates:
   - 2.1 Realization of logic functions with the help of NAND or NOR gates

2.2 Construction of a NOR gate latch and verification of its operation.

3. Half-adder and Full adder Circuits:
   3.1 Construction of hf half adder using EX-OR and NAND gates and verification of its operation.
   3.2 Construction of a full adder circuit using EX-OR and NAND gates and verify its operation.
4. 4 bit adder/subtracter circuit: Construction of a 4 bit adder 2's complement subtracter circuit using and 4 bit adder IC and an EX-OR IC and verify the operation of the circuit.
5. IC Flip-Flop:- Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, edge triggered JK and master slave JK flip-flops).
6. Display devices and their decoder/drivers: Familiarization and use of different types of single LEDs, common anode and common cathode seven segment LED displays. Use of 7447, 7448 (or equivalent) decoder/driver ICs for 7 segment displays.
7. Tristate gate ICs: Verification of truth table and study the operation of tristate buffer IC 74126 or equivalent. Construction of a 48/8 bit bi-directional bus by using and appropriate IC.
8. Decoder, encoder, multiplexer and demultiplexer.
   8.1 Verification of truth table for encoder and decoder Ics
   8.2 Verification of truth table for one/two -- each of multiplexer and demultiplexer ICs

9. Shift Register
   9.1 Construction of a 4 bit serial-in-serial-out/serial -in-parallel-out right shift register using JK flip flops and verification of its operation.
   9.2 Construction and testing for its operation of a 4 bit ring counter using JK flip flops.

10. Universal Shift Register IC:- Verification of truth table for any one universal shift register IC.

11. Asynchronous Counter ICs
    11.1 Use of 7490 equivalent TTL (a) divide by 2 (b) divide by 5 (c) divide by 10 counter.

    or

    Use of 7493 equivalent TTL (a) divide by 2 (b) divide by 8 (c) divide by 16 counter.

12. To construct and test 4/8 bit D/A converter using IC.
13. To construct and test 4/8 bit A/D converter using IC.

NOTE:
The students should be exposed to different digital ICs, related to the experiments and the data book.

KI-301
DATA COMMUNICATION AND NETWORK

L T P
4 - 3

Rationale:-

The Course provides the student with:

1. Principles of digital data transmission.

2. Communication methods and equipments used in data transmission.

3. Errors in data communication and how to deal with them.

1. Communication Concepts:- AM,FM,PCM, Pulse modulation & FSK, PSK. A communication Model , Data communication, data communication networking, need of modulation in data communication. .

2. Data Transmission:- Analog and digital transmission, Transmission impairments (delay distortion, Noise, Bandwidth, channel capacity)Transmission media : Twisted Pair, Coaxial cable, Optical fiber, Microwave and their characteristics.

3. Data Encoding:- Analog signal, Digital Signal, Concept of simplex , half duplex and full duplex modes , Asynchronous and synchronous transmission, Serial and parallel data communication, comparison in terms of speed of data transfer.

4. Error detection techniques:-Sources of errors in data communication. Effect of errors, error detection through parity checks, CRC (cyclic redundancy checks).

5. Multiplexing:-Multiplexed lines, Multiplexing and demultiplexing , Frequency division multiplexing , Time division multiplexing, Direct mode of communication, need of hand shake mode of communication, Physical , electrical, and hand shake aspect of standards RS 232C , IEEE 488.Different types of modems and their working principle , Communication methods and standards.
6. Concept of network security and data encryption methods.
7. Introduction to data Communication test procedures & test equipments; BERT, protocol analysers & cable testers.

Practical Work

- Study of AM and FM modulated signals
- Study of PCM and pulse modulated signals
- Study of different network cables & their testing
- Study of different network connectors
- Study of RS232C ports and observe the signals
- Study of modem and its working
- Study the use of multiplexers and demultiplexers

Book Recommended

Data and computer communication By William Stallings - PHI

K-305
COMPUTER ORGANISATION

L T P
4 - -

Rationale:-

The course provides the student with:-

1. General structure of computers and various organizational structures of its sub units such as processor, memory, I/O.
2. The design features of controller.

DETAILED CONTENTS

1. PROCESSOR ORGANIZATION: General structure of CPU - registers, stacks, ALU and control units. Instruction types, formats, instruction sets and addressing modes. Basic mathematical operations - fixed point, addition, subtraction, multiplication, division. Implementation of fixed point operations and ALU design. F.P. operations and their implementation. Algorithms for addition, subtraction, multiplication and division for F.P. and Floating point operation. H.W. fast addition. Parallel processing : Classification (SSISD, SIMD, MISD & MIMD), principles of array and pipeline processing.

2. DESIGN OF CONTROLLER: Principles of instruction decoding and implementation, hard wired and micro instruction based control units. Horizontal and vertical classes of micro instructions. Identifying micro instruction size, minimizing micro instruction size, parallelism in micro instructions, encoding control instructions, timing cycles and clock generations. Concept of RISC & comparison with CISC processors.

3. MEMORY ORGANISATION: Types of memories - serial access, random access and semi random access, core, semi conductor and bubble memories, memory device characteristics - density, access time, costs, destructive nondestructive read -out, static memories, dynamic memories and memory refresh.
4. MEMORY EXPANSION: Main memory, memory hierarchy, memory references, address mapping, relocation mechanism, concept of memory compaction, principles of virtual memory, segmentation and paging. Interleaved memories and principles of inter-leaving. Associative memories-word organized associative memory, cache memory, masking.
5. I/O ORGANISATION: Memory mapped and I/O mapped I/O. Polled, interrupt and DMA modes of data transfer. Multiple I/O Daisy chaining, polling and parallel priority control. I/O processors, concept of channel.

References Books

1. Morris Mano - Computer System Architecture
2. Morris Mano - Digital Logic & Control Design
3. Raffikuzman - Modern Computer Architecture
4. J.P. Hayes - Computer Architecture and Organization.

KI-302
DATA STRUCTURE USING -C

L T P
3 - 4

RATIONALE

The courses provides the student with :

- The importance of data structure in programming.
- Knowledge of the various types of data structures used.

- Capability of selecting a particular data structure for an application.

DETAILED CONTENTS

1. Problem solving concepts, top down and bottom design, structured programming and debugging techniques, program testing and documentation using C language.

2. Concept of data type and data structure, differences between data type and data structures, view of data structures at logical level, implementation level and application level. Built-in data structures and user defined data structures.

3. Study of the following data structures at logical, implementation and application level :
   - Built in data structures like arrays, records.
   - User defined data structures like stacks, queues, linked lists, circular linked lists, doubly linked lists

4. Concept of dynamic variables, difference between static and dynamic variables, concept of pointer variables.

5. Non linear data structures : trees, terminology of trees, concept & applications of binary trees, tree transversal techniques and algorithms, spanning trees.

6. Sorting and searching algorithms and their efficiency considerations. Insert sort, merge sort, quick sort, heap sort, bubble sort, interchange sort, Linear Vs binary search.

7. Considerations for choice of proper data structure.

List of Practicals

1. Problems on arrays on insertion, deletion and searching.
2. Problems on pointers.
3. Problems on structures.
4. Creation of dynamic integer array.
5. Transformations from infix to postfix, infix to prefix and evaluation.
6. Programs on transformations.
7. Programs on implementation of stacks.
8. Programs on implementation of queues such as initialization, insertion, deletion and searching.
9. Programs on circular queues.
10. Problems on operation of lists.
11. Problems on trees such as construction of binary trees, insertion, deletion and searching of binary trees.
12. Preorder, in order and post order transversal of trees.
13. Programs to count the leaves and to find the height of the binary tree.
14. Programs on sorting such as merge sort , quick sort, heap sort, bubble sort.
15. Searching a linked list for all records with a particular key.
16. Search in to a binary search tree.

Reference Books

1. *Dale & Lily - Pascal & Data Structure*
2. *Schaum Series - Data Structures.*
3. *Tenenbaum, Augenstein - Data Structure using Pascal*

4. *Horowitz and Sahani - Fundamentals of Data Structures.*

K-306
COMPUTER WORKSHOP

L T P
- - 4

1. **Electronic CAD :** Familiarization with electronic CAD Software such as electronic work-bench or CAD. Design of simple analog and digital circuits

using simulation provided by electronic CAD software. Use of existing component libraries adding components to the libraries.

2. **PCB Layout Design** :Manual & auto routing of single and double sided PCBs. Frequency, data transfer rates and currents as factors for consideration in the design of layout. Preparing multilayered boards.

3. **Cables & Connectors** :Commonly usssed cables and connector in computers and in computer networks. Testing of cables, preparation of cables, uses of crimping tools. Soldering & Desoldering Problems enconnectined in soldering & handling sensitive components, low thermal capacity of device, electrostatic chargedamage to tracks. Correct method of handling components & PCBs while soldering and desoldering. Practice in soldering and desoldering the components from single sided, double sided boards. Handling multilayaered boards and surface mounted devices (SMD's).Assembling & Disassembling PCs Range of computers and identification of computer board chip sets.

4. **Instruments & Tools:-** Working principles & use of instruments such as logic probes, logic pulsser, EPROM programmer, logic analyser and microprocessor development system, IC Tester, Scanner.

LIST OF PRACTICALS

1. Familiarization with the circuit simulation and routing aspects of electronic CAD packages like electronic workbench, ORCAD (any suitable package may be used).
2. Practice in the design of analog circuits using at least three to four components.
3. Practice in the design of digital circuits consisting of 6 to 10 SSI/MSI chips.
4. Designing PCB plots for 2 & 3 above using manual and auto routing facilities.
5. Identifications of cables and connectors.
6. Preparing cables, using crimping tools.
7. Soldering, desoldering of sensitive components.
8. Assembling & disassembling computer systems.
9. Use of instruments

Reference Books

1. *Schwartz, Metvin M. - Source book on Brazing and Brazing Technology.*
2. *Dezettel L.M. - ABC of Electrical Soldering.*
3. *Thompstone, R. - Cable joining.*
4. *Bibbro - Microprocessors in Instrumentation and Control.*
5. *Lindsey - The design and drafting of Printed Circuits.*
6. *Gimslieng - Printed Circuit Design.*

K-401
COMPUTER NETWORKS

L T P
4 - 2

Rationale:

The course provides the student with :

a. An understanding of the functioning of networks.
b. Network schemes and standards.
c. Familiarize with the hardware and software requirements of networks
d. Set up and diagnose faults in small LANS.

DETAILED CONTENTS

1. Network needs and goals, application of network topologies , need for protocols and interfaces.
2. OSI reference model, layer service primitives and access points.
3. Introduction to transmission media, analog and digital transmission and switching techniques. ISDN.
4. Introduction to local and metropolitan area networks, protocols -ALOHA, CSMA/CD, IEEE standard 802 for LAN. FDDI, Introduction to satellite network.
5. Functions of data link layer. Protocols - stop & wait and sliding window and their performance.
6. Functions of network layer, Routing algorithm(concept level treatment only), internetworking - Bridges, Gateways.
7. Communication protocols : X.25, TCP/IP, SNA.
8. Network operating systems : peer-to peer networks and client - server networks.
9. Network management , setting up, trouble shooting networks.
10. Brief overview of internet.

LABORATORY WORK

1. Design & establishment of LAN network for homogeneous PC systems.
   1.1 PEER TO PEER
   1.2 Client Server
2. Use of protocol analyzer in establishing and testing protocols.
3. Writing small programs such as file security, file transfer, remote testing, data compression, data encryption & decryption etc. for use in networks.
4. Installation, testing of small LAN and fault location.
5. Hands on experience on Internet.

KNL-403
INTRODUCTION TO MICROPROCESSORS

L P T
4 - 2

RATIONALE

The study of microprocessors in terms of architecture software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to face with mainframe systems. Thus the study of microprocessors is relevant in finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They are also a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessors is an area of specialization. Students of electronics engineering often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

1. **Introduction:**-
   - 1.1 Typical organization of a microcomputer system, and functions of its various blocks.
   - 1.2 Microprocessor, its evolution, function and impact on modern society.

2. **Architecture of a Microprocessor**:
   (with reference to 8085 microprocessor)
   - 2.1 Concept of Bus, Bus organization of 8085
   - 2.2 Functional block diagram of 8085, and function of each block
   - 2.3 Pin details of 8085 and related signals.
   - 2.4 Demultiplexing of Address/Data bus (AD0-AD7). Generation of read write control signals.
   - 2.5 How is stored program executed?

3. **Memories and I/O interfacing**:
   - 3.1 Memory organization, memory map. Partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory and I/O devices.
   - 3.2 Concept of memory mapping.
   - 3.3 Concept of stack and its function.

4. **Programming (with respect of 8085 microprocessor**)
   - 4.1 Brief idea of machine and assembly languages. Machine and Mnemonic codes.
   - 4.2 Introduction format and Addressing mode. Identification of instructions as to which addressing mode they belong.
   - 4.3 Concept of Instruction set. Explanation of the instructions of the following groups of instruction set (of 8085): Data transfer groups, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group.
   - 4.4 Programming exercises in assembly language. (Examples can be taken from the list of experiments)

5. **Instruction Timing and Cycles**:
   - 5.1 Instruction cycle, machine cycle and T states
   - 5.2 How a stored program is executed - Fetch and execute cycle.

6. **Interrupts:**

6.1 Concept of interrupt, mask able and non-mask able, edge triggered and level triggered interrupts. Software interrupt, Restart interrupts and its use. Various hardware interrupts of 8085. Servicing interrupts, extending interrupt system.

7. **Data transfer techniques**:
Concept of programmed I/O operations, sync data transfer. Async data transfer (hand shaking), interrupt driven data transfer, DMA, serial output data, serial input data.

8. 8255 (PPI) its operating modes. Brief idea of 8253, 8279 & 8259.

9. Comparative study of 8 bit microprocessors i.e. 8085, Z80, 6800

LIST OF PRACTICALS

1. Familiarization with 8085 based microprocessor Trainer Kit, Location of 8085, 8279, 8253, keyboard display field, EPROM programmer.
Entering and executing assembly language. Program, codes for insertion deletion, memory move, setting and examining register and memory.

2. Addition of two 8 bit numbers.
3. a) To obtain 2's complement of 8 bit number b) To subtract a 8 bit it number from another 8 bit number using 2's complement.
4. Extract fifth bit of a number in A and store it is in an other register.
5. Count the number of bits in high state in accumulator
6. Check even parity and odd parity of a binary number
7. Addition of two sixteen bit numbers
8. Subtraction of a sixteen bit number from an other sixteen bit number
9. Multiplication of two 8-bit numbers by repetitive addition
10. Divide two 8-bit numbers by repetitive subtraction
11. a) Smallest number of three numbers b) Largest number of three numbers
12. To sort an array of undersigned binary numbers in decreasing/ increasing order
13. Generate timing delay through software.
14. Program 8255 to ON/OFF LEDS.

KI-402
OPERATING SYSTEMS

L T P
4 - 2

RATIONALE:

This course provides the students with an understanding of human computer interface existing in Computer System and the Basic concepts of Operating System and its working. Further, good working knowledge to work in DOS, Windows and UNIX environments is provided by this course.

DETAILED CONTENTS

1. Introduction to Operating System :

1.1 Introduction
1.2 Objectives
1.3 What is an Operating System ?
1.4 Evaluation of Operating Systems
1.5 Types of Operating System
1.6 Operating System Structure

2. Process Management:

2.1 Introduction
2.2 Objectives
2.3 Multiprocessor Concept(Loosely Coupled & Tightly Coupled)
2.4 Processor Scheduling
2.5 Interprocess Communication and Synchronization
2.6 Deadlocks(Prevention ,avoidance & recovery)

3. Memory Management:

3.1 Introduction
3.2 Objectives
3.3 Single Process Monitor
3.4 Multiprogramming with Fixed Partition
3.5 Multiprogramming with Dynamic Partitions
3.6 Paging
3.7 Segmentation
3.8 Virtual Memory

4. File Management:

4.1 Introduction
4.2 Objectives
4.3 File Concept
4.4 Directories
4.5 Disk Organization
4.6 Disk space management methods
4.7 Disk Allocation Methods
4.8 Disk Scheduling
4.9 File Protection

5. DOS :

5.1 DOS Structure
5.2 DOS batch files
5.3 Configuration files
5.4 Shell
5.5 DOS utilities
5.6 BIOS
5.7 DOS interface

6. UNIX :

UNIX feature, structure, services & utilities.

LIST OF PRACTICALS:

- Practical work of DOS, Windows 95, UNIX

REFERENCE BOOKS:

1. **Peterson and Silberschatz Operating Systems.**
2. **Madnick & Donovon - Operating Systems .**

K-404
Computer Assembly & Maintenance

L T P
2 - 4

Rationale:

The course provides the student with necessary knowledge and skills in computer maintenance to be able to diagnose the faults for trouble shooting PC range of Computers and associated peripherals.

DETAILED CONTENTS

1. **Concept of Servicing & Maintenance**:- Reliability of an electronic equipment, MTBF, MTTR, availability of an equipment. Preventive maintenance and need of Preventive maintenance. Factors affecting the performance of computer, Preparation of preventive maintenance schedule. Preventive maintenance requirement of a sub system and auxiliary subsystem.
2. **Instruments & Tools** : Working principles & use of instruments such as logic probes, logic pulsser, EPROM programmer, logic analysis and microprocessor development system, IC Tester, Scanner.
   (b) Breakdown maintenance, scope of field servicing, Analysis of customer call reports in locating faults.

3. Troubleshooting PC faults
   - 3.1 Introduction
   - 3.2 Types of PC faults
   - 3.3 Solid faults
   - 3.4 Intermittent faults
   - 3.5 Troubleshooting PC hardware
   - 3.6 Developing a Good troubleshooting strategy
   - 3.7 Diagnostic & repair tools
   - 3.8 Diagnostic software tools
   - 3.9 Basic Diagnostic hardware tools

4. Symptoms and remedies for common faults in peripheral like printers, monitors, FDD, HDD, mouse and associated interfaces of PC board systems.

5. Architectural features of display adapters, floppy disk controller, Hard disk controller, printer adapter, serial ports.

6. Symptoms and remedies of common faults in PC range of computers and fault diagnosis procedures.

7. Power supply - Linear power supply & switch mode power supply. Significance of power good signal, block diagram and trouble shooting of switch mode power supply.

8. Viruses, their types of detection/prevention/removal using vaccines. Familiarization with PC tools and Norton utilities.

LIST OF PRACTICALS

1. Running diagnostics.
2. Assembling and disassembling of Computer system
3. Virus detection and elimination

4. Trouble shooting of power supplies.
5. Maintenance and trouble shooting of PC based system.
6. Testing, setting and maintenance of printers.
7. Preventive maintenance of computers and peripherals.

Reference of Books

1. Julia Moss: Upgrading, Maintaining & servicing IBM PCs and Compatibles (BPB Publication)
2. Robert C. Brenner : IBM PC troubleshooting & Repair Guide (BPB)
3. Mark Minasi : Upgrading & Maintaining IBM Compatible PCs (BPB)
4. Iansinclaii : PC troubleshooting
5. Scott Mueller :Computer Maintenance & Repair (PHI)
6. Govindarajalu: IBM PC and Clones

K-405
INTRODUCTION TO DATA BASE MANAGEMENT SYSTEMS

L T P
4 - 4

RATIONALE

The course provides the student with:

i. Theoretical foundation and basic concepts of data base management system(DBMS)
ii. Basic concepts of various data base models

iii. Good working knowledge of one of the RDBMS package.

DETAILED CONTENTS

1. **Introduction**
   - 1.1 Objective
   - 1.2 Architecture
   - 1.3 Data Models
2. **ER Model**
   - 2.1 Basic Concept of Entry
   - 2.2 Relationship
   - 2.3 Keys
   - 2.4 Constraints
   - 2.5 Weak Entry
   - 2.6 Extended ER Model Concepts
3. **Relational Data Model**
   - 3.1 Definition
   - 3.2 Relational Algebra and Calculus
   - 3.3 SQL
   - 3.4 Basic Structure
   - 3.5 Grouping
   - 3.6 Aggregates
   - 3.7 Nested Queries
   - 3.8 Views
   - 3.9 Updates
   - 3.10 Query by Example
4. **NORMALISATION** : Introduction, functional dependence, multivalued dependence, normalization - 1NF, 2NF, #NF, BCNF, 4NF, 5NF.
5. **NETWORK MODEL :** Basic concepts of network, data structure diagram, DBTG codasyl model, DBTG data retrieval facility, DVTG update facility, DBTG set processing facility, comments on network model.
6. **Integrity & security constraints**
7. **Concurrency management**
8. **Query Optimization and Evaluation**
   - 8.1 Query Costs
   - 8.2 Techniques for Sorting
   - 8.3 Selection
   - 8.4 Join and Other Operations
   - 8.5 Transformation of Relational Expressions
9. **Transactions**
   - 9.1 Concepts
   - 9.2 Transactions Properties
   - 9.3 Transaction Facilities in SQL

Practical Work

1. Use SQL to Define database Scheme
2. Carry out data retrieval and updated on any DBMS Package (Such as Oracle)
3. MS SQL Server
4. DB2

K-406
MINOR PROJECT WORK

L T P
- - 4

RATIONALE

Minor project work aims at exposing the students to various industries dealing with computers. It is expected from them to get acquainted with industrial environment and acquire desired attitudes. For this purpose, students are required

to be sent to industry for 3-4 weeks at a stretch. Depending on the interest of the students, they are sent for exposure to:

DETAILED CONTENTS

1. Industrial practice in installation and maintenance of computers.
2. Fabrication of computers.
3. Fault diagnosis and testing of computers.
4. Industrial practice in respect of documentation and fabrication
5. A variety of computers and peripherals
6. Various types of software packages

As a minor project activity, each student is supposed to study the various aspects in any one out of the above areas and prepare a detail project report of the observations/ activities made by him/her. The student should be guided by the respective subject teacher. Each teacher may guide a group of 4 to 5 students.

Criteria for assessment will be as follows:

Criteria	Weightage
a) Attendance and Punctuality	15%
b) Initiative in performing tasks	15%
c) Relation with people	15%
d) Report writing and seminar	55%

K-502
MICROPROCESSOR BASED SYSTEM DESIGN AND INTERFACES

L T P
3 - 4

RATIONALE

The course provides the student with :

1. An understanding of the structure of a microprocessor based computer and its working.
2. An understanding of the Architecture of 8085 microprocessor and its inter connections to memory and other devices.
3. Skill in assembly language programming of microprocessors.

DETAILED CONTENTS

1. Microprocessor based system
   - Architecture and organization of a microprocessor based system.
   - Concepts of interfacing and address decoding
   - RAM, ROM Interfacing
   - I/O ports and interrupts.
   - DMA concepts
   - Interfacing slow peripherals

2. Micro controller and peripheral interface chips Features, block diagram, operating modes (wherever relevant and application circuits and programming of the followings:
   - Keyboard & display interface chip 8279
   - Programmable interval timer 8253
   - USART 8251
   - DMA controller 8257
   - CRT controller 6845
   - Programmable interrupt controller 8259

3. Interfacing Real World Signals
   - ADC & DAC concepts
   - Interfacing 8/12 bit ADC
   - Interfacing 8/12 bit DAC
   - Pulse width measurement

4. Bus Interfaces and Standards
   - Serial, RS 232C
   - Centronics parallel
   - GPIB IEEE 488

5. Development Tools
   - MDS & its role in system integration
   - Logic analyzer and its usage

LIST OF PRACTICALS

Practical exercises will consists of mini project of about 60 hours duration in total. The student should concentrate on integration of CPU, memory and I/O aspects of the

problems and not on the interface electronics. Following projects can be considered as examples/ guidelines:

1. Interfacing LEDDs, switches to u(mew)p kit.
2. Interfacing AID and DIA to u(mew)p kit.
3. Interfacing seven - segment display to u(mew)p kit.
4. Wave - form generator - square, saw tooth, triangula.
5. A controller driving the lights or motor in a sequential manner.
6. Measurement of temperature in an intensive care unit
7. Transferring data on serial port.
8. Controlling printer using micro controller chip.

Reference Books

1. Goankar - Microprocessor Architecture, Programming and Applications.
2. Brey - Microprocessor and peripherals.

K-504
COMPUTER SYSTEM ARCITECTURE

L T P
4 - 2

Rationale

The subject provides the students with the knowledge of detailed architectures of currently available microcomputers in order to understand their functioning and maintenance. The single user system based on 8088, 80286, 386 and 486 will get emphasis.

DETAILED CONTENTS

1. Salient features and block diagram of 8088, 286, 386,486, & Pentium processor.
2. Architecture and pin out diagram of important support chips for the above processors - 8087, 8284, 8271, 8272, 74LS138.
3. Bus standards and architectures : ISA, EISA, VESA & PCI.
4. Interface standards : RS 232C, IDE, EIDE, SCSI - II, Fast and wide SCSI, IEEE 488.
5. Introduction to RISC processors : Design of RISC processor based computer system (power PC).
6. Bus architectures of mini computers : VME & Multi bus.
7. Architecture of multiprocessor systems.

List of Practicals

1. Study of the mother boards of 8088, 286, 486 & Pentium processors.
2. Identification of chips sets and functional aspects of different subsystems on each card.
3. Study of the bus system and identifying various signal lines.
4. Study of peripherals used, their speeds & capacities and study of integration of these peripherals into the system.

Reference Books:-

1. Govind Raju : IBM PC and clones
2. Raffiqzzman : Computer Architecture
3. F airhead : 80386/80486 - BPB publication.

KI-501
SYSTEM ANALYSIS AND DESIGN

L T P
4 - -

RATIONALE:

For the design of an information system, it is important to understand the requirements, carry out system study and analyze information. After undergoing this course, the student will be able to study, analyze and design a system for the user.

DETAILED CONTENTS

Part-I. Introduction:

1. System Concepts and the Information Systems Environment:
   - 1.1 Introduction
   - 1.2 Definition
   - 1.3 Characteristics
   - 1.4 Elements of System
   - 1.5 Types of Systems

2. The System Development:
   - 2.1 Introduction
   - 2.2 System Development Life Cycle
   - 2.3 Consideration for candidates Systems
   - 2.4 Prototyping

3. The Role of Systems Analyst:
   - 3.1 Introduction
   - 3.2 Academic and personal Qualifications
   - 3.3 The Multifaced Role of the Analyst
   - 3.4 The Analyst/User Interface.
   - 3.5 The MIS Organization
   - 3.6 Rising position in System Development

Part-II. System Analysis

4. System Planning and the initial Investigation:
   - 4.1 Introduction
   - 4.2 Bases for planning in systems Analysis
   - 4.3 Initial Investment
   - 4.4 Background Analysis
   - 4.5 Fact-Finding
   - 4.6 Fact Analysis
   - 4.7 Determination of feasibility

5. Information Gathering:
   - 5.1 Introduction
   - 5.2 Kinds of information
   - 5.3 Information gathering tools.

6. The Tools of Structured Analysis:
   - 6.1 Introduction
   - 6.2 Structured Analysis
   - 6.3 Tools for structured Analysis
   - 6.4 Pros and Cons of each Tool.

7. Feasibility Study:
   - 7.1 Introduction
   - 7.2 System performance definition
   - 7.3 Feasibility Study

8. Cost/Benefit Analysis:
   - 8.1 Introduction
   - 8.2 Data Analysis
   - 8.3 Cost/Benefit Analysis

Part-III. System Design

9. The Process and Stages of System Design:
   - 9.1 Introduction
   - 9.2 The Process of Design
   - 9.3 Design Methodologies
   - 9.4 Major Development Activities

10. Input/Output and forms Design:
   - 10.1 Introduction
   - 10.2 Input Design
   - 10.3 Output Design
   - 10.4 Form Design

11. File Organization and Data Base Design:
   - 11.1 Introduction
   - 11.2 File Structure
   - 11.3 File Organization
   - 11.4 Data Base Design
   - 11.5 The Role of Data Base Design

Part-IV. System Implementation

Brief Knowledge of

12. System Testing and Quality Assurance
13. Implementation and Software Maintenance
   - 13.1 Hardware/Software Selection and the Computer Contract
   - 13.2 Projects Scheduling and Software
   - 13.3 Security, Disaster/Recovery and Ethic in System Development.

RECOMMENDED BOOKS:

1. System Analysis and Design: Elias M. Awad
2. System Analysis and Design Methods: Jeffery L. Whitten & Lonnie D. Bentley

K-505
Programming using Visual Basic

L	T	P
4	–	4

RATIONALE:

This course aims at introducing the students to the methodology of designing, developing and testing programs in Visual Basic. This Course expose the student to:

a) the concept of system life cycle and the need for a careful design.
b) Various techniques of systems analysis and tools used.
c) Programming methodology including program testing.
d)

DETAILED CONTENTS

1. Introduction:

About visual programming, About Visual Basic, Installing Visual Basic, VB-environment.

2. Developing and Application in Visual Basic:

1 VB concept Window, events and messages, Event-driven models & programming, understanding SDI & MDI.

3. Working with Objects & Controls:

Object Basics, class functions, Adding controls, object model design, ActiveX Controls.

4. Working with Forms:

Creating forms, Adding control to the forms, setting form & controls properties, building object models, adding codes behinds the controls.

5. Connecting to Database:

Data Access Object (DAO), Remote Data Objects (RDO), ActiveX Data Objects (ADO), Building Databases Interface using DAO, Programming with ADO, Adding Databases to an Object Model, Working with VB. Connecting database through ODBC.

6. Working with Reports:

Introduction to reports, Creating simple reports on database in VB, Introduction to Crystal Reports.

7. Designing user interface

Visual elements of a VB application(Menu, Toolbars, Controls & ActiveX, status bar) Animation & time event, aligning controls, setting focus.

RECOMMENDED BOOKS

Visual Basic 6.0 – Noel Jerke

K-506
LANGUAGE LABORATORY

L T P
- - 2

Rationale:-

For a successful completion of a diploma course, a student should possess an adequate command of English, be able to express himself wit reasonable ease and felicity, understand lectures. Te language used by a student should be good ad effective and suitable to the matter tat is conveyed as well as the occasion for which it is composed. The Present Syllabus aims to provide practical training to our students, in the final year of their diploma courses, with the help of language laboratory.

DETAILED CONTENTS

1. Phonetic and Spoken English

2. The speech Mechanism
   - 2.1 A Speech event
   - 2.2 The Production of Speech
   - 2.3 Description of sounds.

3. Word: Accent
   - 3.1 Word Accent
   - 3.2 Stress; Stress change according to functions.
   - 3.3 Weak forms.
   - 3.4 Intonations.

4.
   - 4.1 To organize seminar, declamation.
   - 4.2 To conduct Group discussion & Mock interview.
   - 4.3 Technical report writing.

5. Practice of formal and informal conversations.

Book Recommended:- Spoken English for India

By:-R.K.Bansal

J.B. Harrison

L T P
4 - 4

ELECTIVE -I
KI-503

Network Operating System

RATIONALE

This Course will enable the students to:

(i) Install and manage Linux server.

{ii} Install and mange Windows server.

- The students will be able to create use and give the different access and authority, compatibility of different software with Linux and windows NT.
- Role of a Network Operating System, Role of a Network administrator.

1. **Linux:** Structure of Linux O.S., History of Linux, GNU public license, FSF, concept of Open-source.

2. **Installation:** Gathering information, Fetching device drivers, Hard disk partitioning, Using FIPS, Creation of Installation Disks, Installing Linux.

3. Introduction to various installation options: server, workstation, custom.

4. **Boot loaders:** LILO and GRUB.

5. **X-Windows System:** Configuring X-Windows, X-Windows server, Window Managers, GNOME and KDE.

6. **Linux file structure:** Role of each directory under root directory. Virtual file system, mounting and unmounting CD-ROMs and Floppy Disks.

7. **Linux as a Desktop OS:** GUI and CLI.

8. **Linux commands to:** list files, make directories, remove file and directories, move files and directories, creating links, formatting floppy disks, filters and pagers, I/O redirection, Process management, users and group management, managing file permissions, shell scripts for simple mathematical calculations and using above listed commands.

9. **Connecting to Internet:** Configuring a dial-up connection, web-browsing, e-mail, downloading files, updating Linux.

10. **Sound and Video:** Using xmms, creating play-lists, using different skins for xmms, recording sound.

11. **Printing:** Installing a printer, Sharing a printer.

12. **Linux as a server:** Telnet, ftp, NFS, proxy server, web-server.

Windows-2000:

1. **Installation of Windows-2000 server:** Creating installation disks, upgrading Windows-9x and fresh installation.

2. **File System:** NTFS and FAT Using Telnet on Windows-2000 Comparison of Windows-2000 and Linux.

PRACTICAL WORK

1. Installing Linux using bootable CDROM, using installation floppies.
2. Using FIPS
3. Using various Linux commands
4. Writing shell scripts for simple numeric calculations : +, -, *, /. Using control structures: if-then-fi, case-esca, while, until, for.
5. Using Internet: Visit various Linux sites, downloading files, using email.
6. Using sound and video.
7. Using Telnet on Linux and Windows-2000

BOOKS RECOMMENDED:

1. *Red Hat® Linux Bible® 8.0 by Christopher Negus, Wiley®-Dreamtech India Pvt. Ltd.*
2. *Official Red Hat® Linux® 8 User's Guide, Red Hat Press.*
3. *Complete Reference Linux by Peterson R. TMH*

K-511
MULTIMEDIA COMPUTING

L T P
4 - 4

DETAILED CONTENTS

1. Overview of video standards (NTSC, PAL, SECAM, VHS, S-VHS, HI-8) overview of display standards.
2. Architecture and specification of multimedia system. MPEC-I, MPEC-II. Block diagram of sound card chips such as digital signal processor, FM synthesize. Audio standards : wave MIDI. Concept of sampling rate and sampling size, Digital audio storage requirement, Recording of audio using sound card.
3. Video capturing, block diagram of video capture card.
4. Working principle of CCD cameras, frame rate, frame grabbers, storage requirement of video, Various compression techniques (losing & loss less) such as huff man, JPEG, MPEG.
5. Working principle of CD-ROM drive, storage calculation of CD-ROM, various standards of CD-ROM such ass CD-I, CD-XA, Working principles of CD-/R/W drives and DVD drives
6. Features of voice recognition.
7. Concept of digital morphing.
8. Multimedia authoring software and production of multimedia courseware (Using Power Point and Macromedia author ware, window media player and macromedia flash)

PRACTICALS

1. Familiarization with multimedia software and hardware.
2. Introduction to authoring system.
3. Integration of sound and video in the development of a package using any authority system. (author ware, PowerPoint)
4. Hands on experience in movie making software.(viz. windows movie maker or similar)
5. Work on windows media player & macromedia flash.

Reference Books

1. *Win, Rosch - Multimedia Bible*
2. *Keyes - Multimedia Handbook, McGraw Hill.*
3. *Ozer, Jan. - Multimedia Systems (video compression for multimedia)*

K-601
COMPUTER GRAPHICS

L T P

RATIONALE:

This course will enable the students to understand the basic concepts of graphics and multimedia, familiarize with multimedia input, output and storage devices and appreciate features of multimedia software and develop small applications.

1. **Overview of Computer Graphics:-** : Display Devices : Line and point plotting system, Raster, vector, pixel and point plotters, continual refresh and storage displays, digital frame buffer, very high resolution devices, high speed drawing and display processors, character generators, colour display techniques(shadow mask and penetration CRT, colour look-up display panels.

2. **Display Description: Screen co - ordinates, user co - ordinates**: Graphical data structures (compressed incremental list, vector list, use of homogeneous co - ordinates); display code generation; graphical functions; the algorithm, two dimensional transformation. Interactive Graphics : Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls, interactive graphical techniques : positioning, elastic lines, linking, zooming, panning, clipping, windowing, scissoring. Graphic Languages : Primitives (constants, actions, operators, variables), plotting and geometrical transformation, display subroutines, Device independent graphics. Basic principles of animation, animation of a body in two dimensional space, parameters of animation resolution, speed.

3. **3-D Graphics (the whole treatment will be qualitative**): Wire-frame perspective display, perspective depth, hidden line, and surface elimination, transparent solids, shading. (GKS is to be used as the standard teaching tool).

Practical Work

1. Programming using graphic primitives in C.
2. Writing device independent graphic programs in C
3. Creating animations
4. Explaining GKS features
5. Writing algorithms & programs for 2 dimensions transformations.

Reference Books

1. *Hearn, D ; Baker, P.M. - Computer Graphics (Prentice Hall).*
2. *Foley, J.D.; Van, DAM A - Fundamentals of Interactions Computer Graphics (Addison Wesley).*
3. *Rogers, D.F. - Prodeduarl Elements for Computer Graphics (McGraw Hill)*
4. *Harrington - Computers Graphics - A programming approach.*
5. *Newman, W; Sproul, R.F. - Principles of Interactive Computer Graphics, (McGraw Hill)*
6. *Giloi, W.K. - Interactive Computer (Prantice Hall 1978).*

K-602
OOPS with C+ +

L T P

RATIONALE:

C++ is an object-oriented language, which enables a programmer to write programs, so that the object can be made to work collaboratively to produce the solution to live problems. By undergoing this course, the students will be able to understand the principles of object oriented programming, write programs in C++ and use them to make small application programs.

DETAILED CONTENTS

1. Introduction:

Need for object-oriented programming; characteristics of object-oriented programming languages.

2. C++ Programming Basics:

Basic program construction; Pre-processor directives; variables, manipulators; operators; library functions.

3. Decision – Making:

Relational operators: loops, decisions, logical operators; other control statements.

4. Structures and Functions:

Structures; enumerated data types; functions; passing arguments to functions and returning values from functions; overloading of functions.

5. Objects and Classes:

C++ objects as physical objects and data types; constructors and destructors.

6. Arrays:

Arrays fundamentals; arrays of objects; arrays as class member data; strings.

7. Operator Overloading:

Overloading unary operators; overloading binary operators; data conversion; pitfalls of operator overloading and conversion.

8. Inheritance:

Derived class and base class; derived class constructors, overriding member functions; class hierarchies; public and private inheritance; levels of inheritance; multiple inheritance; ambiguity in multiple inheritance, containership; classes within classes.

9. Graphics:

Text-mode graphic functions; graphic-mode graphic functions; colors; rectangles and lines; polygons and inheritance; sound and motion; text in graphic mode.

10. Pointers:

Addresses and pointers; pointers and arrays; pointers and functions; pointers and strings; memory management, pointers to object.

11. Files and Streams:

Streams; string I/O; Character I/O; Object I/O; I/O with multiple objects; file pointers, disk I/O with member functions; error handling; redirection.

LIST OF PRACTICALS:

1. Programming exercises on control flow statements in C++.
2. Programming exercises on arrays, strings, functions and pointers in C++.
3. Writing programs on classes, constructors and destructors.
4. Programming exercises on operator overloading, type conversion and inheritance.
5. Programming exercises on functional overloading and virtual functions.
6. Writing programs on stream computation and file operations.
7. Implementation of a mini-project in C++.

Recommended Books:-

1. C++ Primer by SB Lippman and J. Lajoie, Addision Wesley(Singapore) Pvt. Ltd., New Delhi.
2. Mastering C++ by KR Venugopal, Rajkumar and T. Ravishankar, TMH Publishing Co. Ltd. New Delhi.

3. Object Oriented Programming with C++ by E.Balagurusamy, TMH Publishing Co. Ltd. New Delhi.

4. Object Oriented Programming with C++ by D Parasons, BPB Publications, New Delhi.

5. Object Oriented Data Structuring using C++ by K.S. Easwarakumar, Vikas New Delhi.

6. Object Oriented Modeling and Design by Rumbaught et al, Prentice Hall of India New Delhi.

YZ-603
INDUSTRIAL MANAEMENT

	L	T	P
Hrs/week	4	-	-

RATIONALE

Industrial management assumes vital importance for diploma holders. He must appreciate the value of leadership, motivation and human relations. In addition he/she must be aware of industrial laws and practice for safety and welfare of labour. Hence this subject.

DETAILED CONTENTS

1. **Principles Of Management:-**
   - 1.1 Management, different functions of management: planning, organizing, coordination and control.
   - 1.2 Structure of an industrial organization.
   - 1.3 Functions of different departments.
   - 1.4 Relationship between individual departments.
2. **Human And Industrial Relations:-**
   - 2.1 Human relations and performance in organization.
   - 2.2 Understand self and others for effective behaviour
   - 2.3 Behaviour modification techniques.
   - 2.4 Industrial relations and disputes.
   - 2.5 Relations with subordinates, peers and superiors.
   - 2.6 Characteristics of group behaviour and trade unionism.
   - 2.7 Mob psychology.
   - 2.8 Grievance, Handling of grievances.
   - 2.9 Agitations, strikes, Lockouts, Picketing and Gherao.
   - 2.10 Labour welfare.
   - 2.11 Workers' participation in management.
3. **Motivation:-**
   - 3.1 Factors determining motivation.
   - 3.2 Characteristics of motivation.
   - 3.3 Methods for improving motivation.
   - 3.4 Incentives, pay promotion, rewards.
   - 3.5 Job satisfaction and job enrichment
4. **Leadership:-**
   - 4.1 Need for leadership.
   - 4.2 Functions of leader.
   - 4.3 Factors to be considered for accomplishing effective leadership.
   - 4.4 Manager as a leader.
5. **Human Resource Development**:-
   - 5.1 Introduction
   - 5.2 Staff development and career development.
   - 5.3 Training strategies and methods.
6. **Wage Payment:**
   - 6.1 Introduction to wages.
   - 6.2 Classification to wage payment scheme.
7. **Labour, Industrial And Tax Laws**:
   - 7.1 Importance and necessity of industrial legislation.
   - 7.2 Types of labour laws and disputes.
   - 7.3 Brief description of the following Act.

     The Factory Act 1948, Payment of Wages Act 1936, Minimum Wages Act 1948, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Employee's state Insurance Act 1948, Provident Fund Act.
   - 7.4 Various types of Taxes- Production Tax, Local Tax, Sales Tax, Excise Duty, Income Tax.
   - 7.5 Labour Welfare Schemes
8. **Accidents And Safety:**
   - 8.1 Classification of accident: According to nature of injuries: fatal, temporary, According to event, According to place.
   - 8.2 Causes of accident psychological, physiological and other industrial hazards.

8.3 Effects of accidents.
8.4 Accident-prone workers.
8.5 Action to be taken in case of accident with machines, electric shock, road accident, fires and erection & construction accidents.
8.6 Safety consciousness.
8.7 Safety procedures.
8.8 Safety measures- Do's and dont's.
8.9 Safety publicity.
8.10 Safety measures during executions of Electrical engineering work.

9. **Environmental Engineering**:
   9.1 Ecology.
   9.2 Factors causing pollution.
   9.3 Effects of pollution on Human health.
   9.4 Air pollution and control act.
   9.5 Water pollution and control act.
   9.6 Pollution control equipment.
   9.7 Solid waste management.
   9.8 Noise pollution and its control.

10. **Entrepreneurship Development:**
   10.1 Concept of entrepreneurship .
   10.2 Need of entrepreneurship in the context of prevailing employment condition of the country.
   10.3 Successful entrepreneurship.
   10.4 Preparation of project report.
   10.5 Training for entrepreneurship development.

11. **Communication**
   11.1 Importance of communication.
   11.2 The communication process.
   11.3 Barriers to communication.
   11.4 Making communication effective.
   11.5 Listening in communication.

12. **Professional Ethics:**
   12.1 Concept of ethics.
   12.2 Concept of professionalism.
   12.3 Need for professional ethics.
   12.4 Typical problems of professional engineers.
   12.5 Code for professional ethics.
   12.6 Professional bodies and their role.

List of Books:

Industrial Management by Mohan & Kapoor.

NOTE

- *An expert from Industry/Institute may be invited to deliver lecture(s).*

ELECTIVE - II
K-611
Web Technology

L	T	P
4	-	3

Rationale:

This course will enable the students to understand the basics of Internet and services and tools on the Internet. Student will also gain a brief introductory knowledge about the forthcoming trends in Web Technology.

Detailed Contents

1. Concept of Information and its relevance and importance in modern day life. Impact of information and information technology in Society.

2. Concept of Computer Network, terminology used in Network.
   - 2.1. Data Communication
   - 2.2. Communication modes
     - 2.2.1. Synchronous and asynchronous transmission
     - 2.2.2. Simplex, half-duplex and full duplex
   - 2.3. Network Classification
     - 2.3.1. LAN, MAN and WAN
     - 2.3.2. Topologies (Bus, Star, Ring, Mesh, Hybrid)
     - 2.3.3. Protocols

3. Basics of Internet:-
   - 3.1. History of Internet and its uses in various fields of life.
   - 3.2. Working of Internet (Conceptual model)
     - 3.2.1. How information flows on the Internet
       - 3.2.1.1. Tools Used like bridges, Routers, Repeaters, Hubs etc.
   - 3.3. Concept of IP Addressing, DNS
   - 3.4. Logging on to internet
     - 3.4.1. Internet connectivity (Terminal emulation, Dial up, dedicated, ISDN etc.)
   - 3.5. Browsing Internet
     - 3.5.1. Introduction of Web Browsers
   - 3.6. Tools and Services on internet
     - 3.6.1. Email, Usenet, FTP, Telnet, IRC, Video conferencing etc.
     - 3.6.2. Search Engines, Proxy Server.

4. Concept of World Wide Web:-
   - 4.1. Hypertext, Hyperlink, Hypermedia, URLs.

5. Developing web pages using HTML:-
   - 5.1. Simple HTML tags, inserting graphics and other media,
   - 5.2. Using tables, forms.
   - 5.3. Introduction to Frames and Style Sheets
   - 5.4. Introduction of Front Page

6. Web Publishing:-
   - 6.1 Preparing and testing Web site, publishing web site and introduction to tools to be used for the same

7. Introduction of emerging Technologies:-
   - 7.1. Brief introduction of E-commerce, Active –X controls, XML, VOIP, WAP, Scripting languages, Java Beans, Enterprise Java Beans

PRACTICALS

1. Connecting to Internet (Installation of modem, protocols etc)
2. Configuring Proxy server
3. Using services like email, chat etc.
4. Using search engines to search information on Internet

5. Using Telnet
6. Using FTP
7. Using IRC
8. Web page creation using HTML
9. Using Front Page to develop Web pages.
10. Demonstration of video conferencing

K-612
COMPUTER BASED INSTRUMENTATION AND CONTROL

1. **Introduction to control system:-** Basic concepts of control system. Types of control systems, analog & digital control systems, application based control systems such as process control, sequential control, numerical control, servo mechanism. Important parameters of a control systems such as stability

sensitivity, accuracy & speed of response. Control systems block diagram and signals flow graphs.

2. **Sensors:-** Temperature sensors such as thermistor, resistor, thermocouple, IC temperature sensors. Strain gauge sensors, types, mounting methods and specification. Photo device like (Photo diode, Photo Transistor, Photo conductive cell, LDRS. Hall affect device.Potentiometers. LVDT, magnetic proximatry, switches & shaft position encodes.

3. **Signal Conditioning:-** Review of potentiometers, AC & DC bridges, Reviews of amplifiers, including high input impedance circuits/devices. Opt couplers and optointerrupeters. Process of digitization, A/D & D/A conversion, standard A/D D/A conversion cards & their specification.Multiplexed A/D converter & specification.

4. **Control Elements:-** Solenoids, fears, relays, DIP switches, solid state switches. DC motors, speed torque characteristics speed control techniques stepper motor principles, permanent magnet stepper motor, single stach and multistack variable reluctance stepper motors hyprid stepper motor, static dynamic torque characteristics, motion control of stepper motors.

5. **Control Systems**:
   - Block diagram, classification, transfer function.
   - Feedback in Control Systems : Proportional control, integration control, proportional plus integration, derivative control, proportional plus derivative control, phase leg and lead control, gardratic and combination blocks. Simplification methods, cascaded or series scanning junction cascade blocks. Simplification methods, cascades or series scanning junction cascade blocks, case off points and its movements, moving summary junction, signal flow graphs constration transfer function determination.
   a. An overview of analog control systems.
   b. Digital control systems.
   c. Microprocessor based control systems.

6. **Real time systems and distributed control:-**
   a. Real time control, considerations in terms of software.
   b. Hardware systems and reliability, concepts of distributed control.

List of Practical

The laboratory work involve open ended experimentation & following are just the guidelines & by no means are exhaustive.

1. Familiarization with different transducers & their characteristics.
2. Familiarization with interface standard such as RS 2321, centronics parallel.
3. Familiarization with A/D cards & their specification.

4. Interfacing & programming the A/D card of measurement of parameters like pressure, temperature distance etc. using appropriate transducers & signal conditioning circuits.
5. DC motor control using computers.
6. Stepper motor control using computer.
7. Case study of computer based process control system.

Reference Books

1. Gopal. M - Digital Control System
2. Orgata - Digital Control System.

K-613
Core JAVA

Rationale:-

This course provides the student with:

- Understanding of Programming methodology for problem solving. Programming skills in JAVA.

DETAILED CONTENTS

1. **Programming Models:-**Procedural programming, Object oriented programming. Advantage of Object oriented programming, Characteristics of object oriented programming, Abstraction, Encapsulation, Inheritance, Polymorphism.

2. **Introduction to Java:-** History of Java, Features of Java, Introduction of Java programs : Applet ,Application.

3. **JDK Tools:-** The javac Compiler, The Java Interpreter, The Applet viewer, The jdb Tool, The javap Dissembler, The javadoc Tool, The javah Tool

4. **Java Fundamentals:-** Keywords, Data Types: Primitive Data types byte, short, int,float, double, characters, Boolean, Abstract or Derived Data Types Variables, Variable naming conventions, Variable Initialization, Assigning values to variables Literals Operators, Arithmetic Operators, Assignment Operators, Unary Operators, Comparison Operators, Shift Operators, Bit wise Operators, Logical operators, Conditional Operators, The new Operator, Order of precedence of operators, Type Conversion(Casting).

5. **Decision Constructs:-**The If….else construct, The switch construct, Looping Constructs, The while Loop, The do….while Loop, The for Loop, Arrays: Single – Dimensional Arrays, Two-Dimensional Arrays.

6. **Introduction to Classes**: Declaring a class ,Comment entries, Naming classes, Creating an object, Data members: Declaring Data Members, Indentation, Naming Variables.

7. **Methods** : Declaring Methods, Naming Variables, using class members, Invoking a method, Passing arguments to a Methods, constructor, Access specifiers, Modifiers, Abstract Classes, Scope of variables, The main method: Rules for Coding the main( ) Method, Overloading : Method Overloading, function Signature, Constructor Overloading, Inheritance: Super classes and Subclasses, Types of Inheritance: Single inheritance, Multiple Inheritance, Implementing Inheritance ,Abstract Classes, Steps for Implementing an Interface, Overriding Methods: Rules for overriding methods, using super keyword with constructor

8. **Exception Handling:** Need for exception handling, The exception classes, Exception Handling Techniques, The Try Block , The catch Block , Multiple catch Blocks, Nested try and catch blocks ,the throws statement, The finally Block, Common Exceptions: The Arithmetic Exception, The Null Pointer Exception, The Array Index Out of Bounds Exception.

9. **Applet and Application**: The Applet Class, Applet and HTML, The Applet Tag, Life cycle of an Applet, color, Fonts, Graphics Class, drawing text ,line &shapes, loading & drawing images, sounds. The Applet Context Interface, converting Applets to Applications.

10. **Java Architecture:-** Java vitual machine, The Java class file, The Java API , features offered by the Java Architecture: Platform Independence, Security , Network Mobility.

11. **Threads:-** Overview of threads, single threaded and multithreaded Applications, the thread class, the Runnable Interface, Life Cycle of a thread, Synchronization of Threads

12. Using AWT in application and applet:
User Interface: Abstract Window Toolkit, Components :Features of component class, containers: The Frame Class, The Dialog Class, The Panel Class Components and Controls: Label, Button, Choice, List, Checkbox, Menus. Images: Type of image formats, Properties of an Image, Displaying an image.

List of Practicals : Practical work on JAVA to be decided by the teacher.

Book Recommended:

The complete reference JAVA by Herbert Schildt TMH

K-604
INDUSTRY ORIENTED MAJOR PROJECT WORK

L T P
- - 8

DETAILED CONTENTS

Major project work is meant for solving live problems faced by computer and electronics industries by applying the knowledge and skill gained through the diploma course will identify live problems pertaining to computer industries. The activity of problem identification should begin well in advance (say in the beginning of fifth semester). Students should be allotted a problems there should be not more than two students in a group. The student will execute the project work under the guidance of teachers. Each teachers would not have more than 6 students for guiding major project work. The students will be given major project assignment at a stretch for the last 8 week during the final semester. During this project period, concerned teacher will monitor the progress of students by paying regular visits to the industry. The students will submit a comprehensive project report (in a presentable manner, preferably typed and bound)for evaluation by the teachers guide, an expert from industry external examiner.

Some of the project activities are given below:

1. Projects related to repair and maintenance of computers.
2. Projects related to design of PCBS.
3. Projects related to setting up of a small computers centre.
4. Project related to assembly and fabrication of a PC.
5. Software projects related to industry (by using RDBMS)
6. Projects related to multimedia.
7. Projects related to system software e.g writing of device drivers.
8. Projects related to testing, faults diagnosis of repair of:
    - Motherboards.
    - SMPS
    - FDD
    - HDD
    - CD
    - Printers
    - Monitors
    - Plotters

9. Project related to maintenance of common faults in a PC range of computers & various faults diagnosis procedure.
10. Projects related to networking e.g. set up diagnose faults in small LANS.
11. Projects related to process control, data acquisition system.
12. Projects related to instrumentation, robotics etc.
13. Projects related to systems design and office automation.
14. Projects related to computer graphics, Object oriented programming.

Any other related problems of Industry.

The students of computer engineering will be placed for industrial training in industries and establishment dealing with computer fabrication, integration interfacing

automation maintenance services, maintenance manual documentation for software/hardware.

Assessment criteria will be as under:

- Attendance and Punctuality 15% weightage
- Initiative in problem solving 30%
- Relationship with people 10%
- Execution of project and report writing 45%

6. RESOURCE REQUIREMENT

The resource requirement is worked out on the basis of an intake of 30 students/yr and a laboratory class of 15.

6.1 Space Requirements

Type	Number	Area of each area in sq.m	Total area in sq.m

Lecture Halls	4	75	300
Laboratories (see section 2 for details)	8	60 to 120	750
Store Section	1	50	50
Maintenance Section	1	50	50
Office Area	1	50	50
Faculty	11	20	220
		Total Area	1420

6.2 Laboratories

The List of Laboratories is given below. It is assumed that the group size in Laboratory is assumed to be 16 or less for calculation of the area and equipment.

Sr. No.	Name of Lab.	Suggested area in sq.m	Cost of equipt in lacs of Rs.	Cost of Furniture lacs of Rs.	Cost of A/C in Lacs of Rs.
1.	Physics	90 includes dark room of 15 sq.m	5		
2.	Electrical Engineering	90	10		
3.	Mechanical Engineering	120	10		
4.	Electronics	90	10		
5.	Electronics Workshop	60	10	.50	
6.	Digital & Microprocessor Lab.	90	25	1.00	1.5
7.	Comp- Engg.	120	20	1.00	2.0
8.	Computer Centre	90	14	1.50	1.5
	Total	750	104	4.00	5.0

Total Cost of equipment & Furniture - Rs. 108 Lacs

Total cost of Building (750 Sq.m + 40%

Circulation space) and at Rs. 8,000/Sq.m - Rs. 84.00 Lacs

Note 1: Where Polytechnic has other branches, the laboratories 1 to 4 can be common. No additional space is required for them. However equipment grant of Rs. 2 lacs may be provided to each Lab(1 to 4) so that the special requirements of the DCE course are met.

Note 2: When more than one group is to go into the labs when intake is 30, the area of laboratories 6, 7, 8 may be increased by 30%.

Note 3: Laboratories at 6 & 7 may be organized close the each other so that equipment can be optimized. During Lab sessions, the equipment can be moved from labs to lab depending upon needs.

6.3 Staff Requirements:

Sr. No.	Name of Post	Require -ments	Salary	Qualification
1.	HOD	1		B.Tech/MCA 8 Yrs.} See note -1
2.	Sr. Lecturer	1		B.Tech/MCA (5 Yrs.} below
3.	Lecturers	3		B. Tech /MCA/
4.	Technicians for labs 5 to given in section.	4		DCE
5.	Steno Typist	2		
6.	Office Assistant	2		
7.	Class -IV	2		

Note 1: Of the 5 positions(HOD+Lect+Lecturer), 2 positions may be filled with persons holding qualification of B.Tech in Comp.Sc & Engg., One may be filled with persons holding B.Tech in Electronics with microprocessors or computers as specialization, two positions may be filled with B.Tech in Comp. Sc or MCA. Rest positions are to be account against the teaching load English, Physics, Mathematics, Electrical Engg and Mechanical Engineering subjects, as per norms.

LIST OF PARTICIPANTS

I. The following persons participated in the Workshop held at Directorate, Technical Education, Sundernagar with the curtsey of Composite Curriculum Development Centre(CCDC) on 5th & 6th March,2003 for designing of new Curricula of Computer Engineering in Himachal Pradesh.

Sr. No.	Name of Participant	Designation	Institution
1.	Sh. P.P. Sharma	H.O.D.(CCDC)	Directorate
2.	Sh. Neeraj Uppal	Technical Officer	Directorate
3.	Sh. Anil Kanwar	Technical Officer	Directorate
4	Sh. Anil Sood	Lecturer	Govt. Poly. Col. Kangra
5.	Sh. Pradeep Katoch	Lecture Computer Engg.	Govt. Poly. Col. Kangra
6.	Smt Naina Lakhanpal	Lecturer Computer Engg	Govt. Poly. Col. Hamirpur
7.	Miss SonaliMalhotra	Lecturer Computer Engg	Govt. Poly. Col. Gagret
8.	Sh. Chander Shekhar	Lecturer Computer Engg	Govt. Poly.(W)Kandaghat
9.	Sameer Bharati	Lecturer Computer Appl	Govt. Poly. Col. Hamirpur
10.	Sh. D.R. Sharma	Lecturer Computer Appl	Govt. Poly. Col. Sundernagar
11.	Sh. Sudhir Sen	Computer Asstt.	Directorate

II. The following persons participants attended the workshop held on 26th June,2003 for finalization of curriculum for Diploma in Computer Engineering held at Directorate with the curtsey of Composite Curriculum Development Centre(CCDC).

Sr. No.	Name of Participant	Designation	Institution
1.	Sh. P.P. Sharma	H.O.D.(CCDC)	Directorate
2	Sh. D.R. Sharma	Head Computer	Govt. Poly. Kangra
3.	Sh. V.P. Sharma	D.E. Principal	CTTC, Sundernagar
4.	Sh. A.P.Gupta	SDE	CTTC, Sundernagar
5.	Sh. Neeraj Uppal	Technical Officer	Directorate
6.	Sh. Anil Kanwar	Technical Officer	Directorate
7.	Sh. Sameer Bharti	Lecture Computer App.	Govt. Poly. Hamirpur
8.	Sh. Sudhir Sen	Computer Asstt.	Directorate

Composed by : Sudhir Sen