Annexure-3

PERIYAR UNIVERSITY
SALEM 638 011

PERIYAR INSTITUTE OF DISTANCE EDUCATIONS (PRIDE)

P.G. DIPLOMA IN COMPUTER AIDED DESIGN

ONE YEAR PROGRAMME

NON SEMESTER

REGULATIONS AND SYLLABUS

(Effective from the Academic year 2007-2008 and thereafter)

PERIYAR UNIVERSITY, SALEM - 11
PERIYAR INSTITUTE OF DISTANCE EDUCATIONS
PRIDE

PG DIPLOMA IN COMPUTER AIDED DESIGN (PGDCAD) ONE YEAR PROGRAMME

Regulations

Effective from the Academic year 2007 – 2008 and thereafter

1. CONDITION FOR ADMISSION

The candidate who has passed B.Sc. Computer Science, B.C.A., B.Sc. Information Science, and B.Sc. Information Technology of this University or any degree with diploma in CAD/CAM/CA or any other University accepted by the syndicate as equivalent thereto subject to such conditions as may be prescribed therefore shall be permitted to appear and qualify for the P.G. Diploma in CAD degree Examination of this University after a course of one academic year.

2. DURATION OF THE COURSE

The course for the P.G. Diploma in COMPUTER AIDED DESIGN shall consist of one Academic year.

3. COURSE OF STUDY

The Course of Study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

1. **MACHINE DRAWING**
2. **MACHINE SHOP TECHNOLOGY**
3. **ROBOTICS**
4. **ENTREPRENEURSHIP DEVELOPMENT**
5. **COMPUTER AIDED DESIGN**
6. **PRODUCT DESIGN AND DEVELOPMENT**
7. **ENGINEERING DESIGN**
8. **INDUSTRIAL ENGINEERING AND MANAGEMENT**
9. **Practical I: AUTOCAD LABORATORY**
10. **Practical II: CAD LABORATORY**
11. **Practical III: GRAPHICS LABORATORY**

4. EXAMINATIONS :

The examination shall be three hours duration to each paper at the end of the year. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

The external examiners should conduct the practical Examinations at the end of the year.

5. SCHEME OF EXAMINATIONS

The Scheme of Examinations for different years shall be as follows:

S. No	Paper Code	Title of the Paper	Exam Duration	Maximum Marks
1.		**MACHINE DRAWING**	**3**	**100**
2.		**MACHINE SHOP TECHNOLOGY**	**3**	**100**
3.		**ROBOTICS**	**3**	**100**
4.		**ENTREPRENEURSHIP DEVELOPMENT**	**3**	**100**
5.		**COMPUTER AIDED DESIGN**	**3**	**100**
6.		**PRODUCT DESIGN AND DEVELOPMENT**	**3**	**100**
7.		**ENGINEERING DESIGN**	**3**	**100**
8.		**INDUSTRIAL ENGINEERING AND MANAGEMENT**	**3**	**100**
9.		**Practical I:AUTOCAD LABORATORY**	**3**	**100**
10.		**Practical II: CAD LABORATORY**	**3**	**100**
11.		**Practical III: GRAPHICS LABORATORY**	**3**	**100**
			Total :	1100

6. QUESTION PAPER PATTERN

a. For Theory

Time: 3 Hours Max. Marks: 100

Passing Min : 50

PART – A: 5X5 = 25

(Answer all Questions)

(Two Questions from each unit with Internal Choice)

PART – B: 5X15 = 75

(Answer all Questions)

(Two Questions from each unit with Internal Choice)

b. For Practical

Time: 3 Hours Max. Marks : 100

Passing Min : 50

One / Two Compulsory Problem(s) to be solved within 3 hours.

c. Distribution of the marks

Practical :

- For Writing procedures/programs in the main answer book 40%
- For listing and debugging 40%
- For correct and formatted output 20%

7. PASSING MINIMUM

The candidate shall be declared to have passed the examinations in a Theory/practical of study only if he/she secures not less than 50% of the total prescribed marks for the subject in the University Examinations.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in **First Class**. All other successful candidates shall be declared to have passed in **Second Class**. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed for the course at the first appearance.

9. COMMENCEMENT OF THIS REGULATION:

These regulations shall take effect from the academic year 2007-08, i.e., for students who are admitted to the first year of the course during the academic year 2007-08 and thereafter.

1. MACHINE DRAWING

UNIT - I SECTION VIEWS:
Introductions – need for sectioning – Hatching – Inclination of hatching lines – Spacing hatching lines – Hatching of larger areas – Hatching of adjacent parts – sketch and of full section, Half sections – types, Partial or local sections, Revolved or super imposed, Removed sections and offset sections.

UNIT - II LIMITS, FITS AND TOLERANCES
Introduction – Definition of various terms used in limits – Hole basis system – Shaft basis system –Types of fits – Selection of fits and applications – types of tolerances – form and position – Indication of tolerances and fits on the drawing.

UNIT – III KEYS AND SURFACE FINISH
Introduction – Types of keys – taper keys – Parallel or feather keys – wood druff keys – Empirical relation between diameter of the shaft and width & thickness of key for the above types of keys. Definition – Nominal surface – roughness – waviness – lay – productions methods and surface quality– symbol for lay – Indication of surface roughness for various machining operations.

UNIT - IV SCREW THREADS AND THREADED FASTENERS
Introduction – Nomenclature of screw threads – Basic profiles or forms of screw threads – Left hand and right hand threads – Internal and external threads – Drawing of vee and square threads –Application of threads – Bolts and Nuts – Drawing of Hexagonal bolt and Nut – Drawing of square head bolts – Riveted head – Types.

Text Books
1. Machine Drawing – N. D. Bhatt
2. Machine Drawing – K. R. Goplakrishnan

Reference Book
1. A First year Engineering Drawing, By A. C. Park is san, First Rep 1982, A. H. Wheeler & Company (P) Ltd, 15, L. B. Shastri marg, Allaghabed – 211 001.

2. MACHINE SHOP TECHNOLOGY

UNIT-I:

Planer: Types of planers-description of double housing planer-specifications-principles of operation-drives-quick return mechanism-feed mechanism-types, work holding devices and special fixtures-types of tools-various operation.

Shaper: Types of shapes-specifications-standard-plain-universal-principles of operations drives- quick return mechanism-crank and slotted link-feed mechanism-work holding devices-tools and fixtures.

Slotter: Types of slotters-specifications-method of operation-Whitworth quick return mechanism-feed mechanism-work holding devices-types of tools.

UNIT -II:

Drilling machines: Drills-flat drills-twist drills-nomenclature-types of drilling machines-bench type-floor type-radial type-gang drill-multi spindle type-principle of operation in drilling-speeds and
feeds for various materials-drilling holes-methods of holding drill bit-drill chucks socket and sleeve-drilling-reaming-counter sinking-counter boring-spot facing tapping- deep hole drill-drill jigs.

Milling machines: Types-column and knee type-plain-universal milling machine-vertical milling machine specification of milling machines-principles of operation-work and tool holding devices arbor- stub arbor-spring collets-adaptors-milling cutters-plain milling cutter-slab milling cutter-slitting saw-side milling cutter-angle milling cutter-T-slot milling cutter-woodruff milling cutter-fly cutter-nomenclature of milling cutter-milling process-conventional milling-climb milling-milling operations-straddle milling-gang milling-vertical milling attachment-types of milling fixtures.

UNIT-III:

Grinding machines: Types and classification-specifications-rough grinders-floor mounted hand grinders- portable grinders-belt grinders-precision grinders-cylindrical, surface, centre less grinders-internal grinders-planetary grinders-principles of operations-grinding wheels abrasives- natural and artificial-dressing and truing of wheels-

Broaching: Types of broaching machine-horizontal vertical and continuous broaching-principles of operation-types of broaches-classification-broach tool nomenclature-broaching operations-simple examples.

Boring and Jig boring: Boring machines-horizontal and vertical types-fine boring machines-boring tools-jig boring machine-measuring system-hole location procedure-deep hole boring.

UNIT-IV:

Gear manufacturing practice-Forming and Generating processes:

Gear forming process in milling-dividing head-principles of operation-indexing-linear indexing rapid, simple-differential and angular indexing-problems-gear milling-cutter selection nomenclature- module-pressure angle-milling procedure for spur, helical and bevel gears problems- other forming processes for manufacturing of gears. Generating process-gear shaper-gear hobbing-principe of operation only-gear finishing processes-burnishing-shaving-grinding and lapping-gear materials-cast iron,steel,alloy steels, brass, bronze, aluminium, nylon, fibre-no problems.

UNIT-V:

Jigs and Fixtures:Definitions and concept of Jig and fixture-Advantages of jigs and fixtures-elements of jigs and fixtures-locating devices-'V' locators-fixed stop locators-adjustable stop locators-clamping devices-strap clamp, screw clamp-cam action clamp-types of jigs-box drill jig-indexing drill jig types of fixtures-keyway milling fixture-string milling fixture.

Press working: Types of presses-mechanical and hydraulic presses-press tools and accessories-press working operations-bending operations-angle bending-curling-seaming-shearing operations blanking, punching, curling off-trimming-notching-slitting-lancing-shaving.

Non-Conventional Machining process: Ultrasonic machining-chemical machining-electro chemical grinding-electrical discharge machining-plasma arc machining-laser machining.

Text book:

1. Elements of Workshop Technology-I& II-Hajra Choudry & Battacharya

REFERENCE BOOKS:

1. Production Technology-HMT
2. Production Tech- Jain & Gupta
3. Workshop Tech Vol I,II, III-Chapman
4. Production processes TTTI, Chennai

3. ROBOTICS

UNIT - I:

Introduction – definition – basic configuration of robotics and its working – robot components – manipulator, end effectors, drive system, controller, sensors – mechanical arm – degrees of freedom – links and joints – construction of links, types of joint – classification of robots – cartesian, cylindrical, spherical, horizontal articulated (SCARA), vertical articulated – structural characteristics of robots – mechanical rigidity – effects of structure on – control - work envelope and work volume - robot work volumes and comparison – wrist rotations – mechanical transmission, pulleys, belts, gears, harmonic drive – conversion between linear and rotary motion and its devices.

UNIT - II:

Robot controller – level of controller – open loop and closed loop controller – servo systems – microprocessor based control system – robot path control – point to point – continuous path control – sensor based path control – controller programming – actuators – dc servo motors – stepper motors – hydraulic and pneumatic drives - feedback devices – potentiometers – optical encoders – dc tachometers.

UNIT - III:

Robot motion analysis – robot kinematics – robot dynamics - end effectors – grippers and tools - gripper design – mechanical gripper – vacuum gripper – magnetic grippers – sensors – transducers – tactile sensors – proximity sensors and range sensors – force and moment sensors and its applications and problems - photoelectric sensors – vision system – image processing and analysis – robotic applications – robot operation aids – teach pendent – MDI and computer control.

UNIT - IV:

Robot programming – lead through methods and textual robot languages – motion specification - motion interpolation - basic robot languages – generating of robot programming languages – On-Line & Off-Line programming - robot language structure – basic commands – artificial intelligence and robotics.

UNIT - V:

Robot application in manufacturing – material handling – press loading and unloading – die casting – M/c tool loading and unloading – spot welding, arc welding – spray painting – assembly finishing – adopting robots to work station - requisite and non – requisite robot characteristics – stages in selecting robot for individual application – precaution for robot – economic analysis – social and labour issues – future of robotics.

REFERENCE BOOKS:

1. Industrial Robotics – Technology – Programming and Applications - Mikell P. Groover, Mite chell weiss, Roger Negal and Nicholes G. Odress.
2. Robotics – An Introduction – Doughales – R. Halconnjr.

4.ENTREPRENEURSHIP DEVELOPMENT

UNIT-I:

Entrepreneurial culture and structure – competing theories of entrepreneurship – entrepreneurial traits – types – behavioural patterns of entrepreneurs – entrepreneurial motivation – establishing entrepreneurial systems – idea processing, personnel-financial-information and intelligence, rewards and motivation – concept bank, role of industrial fairs.

UNIT-II:

Search for a business idea, sources and selection – project classification and identification – constraints – features of ancillary units, consumer products, feasibility prospects, project objectives, design and appraisal format for report- network analysis- activity performance – time schedules – factory design – design requirements – applicability of the factories act.

UNIT-III:

Financial analysis – capital cost, operating cost estimation and budgeting under uncertainty – risk and inflation – proforma profit and loss, balance sheet – cash flow statement – social cost benefit analysis, project sources of project finance, credit facilities – types – evaluation by the financial institutions – role of consultancy organizations – uses of leasing arrangements – institutions providing technical, financial and marketing assistance.

UNIT-IV:

Marketing channel – selecting channel members – setting quality standards – requirements strategies. Types of relevant institutions – entrepreneurship development programme in India - prospects.

UNIT-V:

Steps for starting a small industries – selection of types of organizations – incentives and subsidies – central government scheme and state government schemes, incentives to SSI – registration, registration licensing requirements for sales tax, CST, exercise duty, power, exploring the export possibilities – incentives for exports – import – import of capital goods and raw materials.

REFERENCE BOOKS

1. Khanka, S S. Entrepreneurial Development, S.Chand & Co, New Delhi 1999.
2. Gupta, C B. and Srinivasan, N P Entrepreneurial Development: Text and Cases - 3rd ed. Sultan Chand & Sons, New Delhi 1995.
3. Hisrich, Robert D. and Michael P Peters Entrepreneurship --5th ed.: Tata Mcgraw-Hill,. New Delhi, 2002.

5. COMPUTER AIDED DESIGN

UNIT –I

Introduction – CAE – The design process – CAD – Methodology – Uses – Reasons for implementing CAD – Benefits – Implementation – Choice of CAD system Applications – CAD system architecture – Computer Display Devices – Input devices – Keyboard devices – menus – Output Devices – CAD System Software – Computer programming Languages.

UNIT – II

Interactive computer graphics: Introduction – 2-D and 3-D Display Control Facilities - 2-D and 3-D Transformation – The user computer interface – Entity manipulation facilities – Graphics Systems and standards – Model Storage and data structure.

UNIT – III

Modelling Techniques – 3D Modelling – Geometric modeling Techniques and functions.

UNIT-IV

Computer Aided Drafting: Introduction – CAD model and draughting – 2D drafting and drafting system configuration – Automated 2D drafting – CADD Software Packages-AutoCAD – Orthographic Projections.

UNIT-V

Finite Element Method: Introduction – The finite element method –Discretization of domain – Interpolation polynomials – Convergence requirements – Characteristics Matrices and vectors – Coordinate Transformation – Assembly of element matrices and vectors – Solution of system of equations – Element resultants – Higher order 1D elements - Natural Coordinates – Isoparametric elements – Finite element formulation of solid mechanics problems – CAD application to FEM – Interfaces to CAD.

TEXT BOOK:

1. Sadhu Singh, " Computer Aided Design and Manufacturing ", Khanna Publishers, New Delhi, 1998.

REFERENCES:

1. D.F. Rogers and J.A.Adams, " Mathematical Elements in Computer Graphics ", McGraw-Hill Book Company, New York, 1976.
2. P.Radhakrishnan and C.P.Kothandaraman, " Computer Graphics and Design ", Dhanpat Rai and Sons, New Delhi, 1991.
3. P.Radhakrishnan and S.Subramanyan, " CAD / CAM / CIM ", Wiley Eastern Ltd., New Age International Ltd., 1994.
4. Groover and Zimmers, " CAD / CAM : Computer Aided Design and Manufacturing ", Prentice Hall of India, New Delhi, 1994.
5. Ibrahim Zeid, " CAD - CAM Theory and Practice ", Tata McGraw Hill Publishing Co. Ltd., 1991.

6. PRODUCT DESIGN AND DEVELOPMENT

UNIT-I: CREATIVE THINKING AND PRODUCT INNOVATION

The product and process design function. Locating ideas for new products. Selecting the product. Qualifications of the production design engineer, Creative thinking curiosity and imagination.

UNIT-II: CRITERIA FOR PRODUCT SUCCESS

Areas to be studies preparatory to design market research functional design. The value of appearance - Principles and laws of appearance - Incorporating quality and reliability into the design. Man Machine considerations-Designing for case of maintenance.

UNIT-III: COST AND PRODUCT DEVELOPMENT

Sources of funds for development cost - Product costs - Estimating product costs - Kinds of cost procedures - Value Engineering - Cost reduction.

UNIT-IV: PATENTS

Classes of exclusive rights - Patents-Combination versus aggregation - Novelty and Utility - Design patents - patent disclosure - patent application steps - Patent office prosecution - Sales of patent rights - Trade marks - Copy rights.

UNIT-V: QUALITY CONTROL AND RELIABILITY

Quality Control procedure - Inspection and test equipment - Statistical quality control - Manufacturing Reliability - Probability of tool reliability - Reliability operations - Developing a quality-control and reliability programme.

REFERENCES:

1. Ulrich Karl.T., Product design and development, 3rd Edition, Tata McGraw Hill, New Delhi, 2005.
2. Niebel.B.W. and Draper.A.B., Product Design and Process Engineering, McGraw Hill Book Company, New York, 1974.
3. Kevin Otto and Kristin Wood, Product design: Techniques in reverse engineering and new product development, Pearson education Inc, New Delhi, 2004.
4. Chitale.A.K., Product design and manufacturing, Prentice-Hall of India, New Delhi, 2005.
5. Zaidi.A., SPC Concepts - Methodologies and Tools, Prentice Hall of India Pvt. Ltd., 2003.

7. ENGINEERING DESIGN

UNIT – I:
Importance of product design – design process – organization for design – design to codes and standards – product and process cycles – societal considerations. Identifying the customer needs – benchmarking – product design specification

UNIT – II:
Gathering information – Copy right and copying – Patent literature – expert systems. Creativity and problem solving – Conceptual decomposition – generating design concepts – evaluation methods - decision making.

UNIT – III:
Materials selection – economics of materials – materials performance indices – decision matrices – value analysis – materials selection design examples. Materials processing and classification of manufacturing process.

UNIT – IV:
Economic decision making – cost comparison – depreciation – profitability – inflation – breakeven analysis. Cost evaluation – categories of cost – cost indexes – cost models – life cycle costing.

UNIT – V:
Legal issues and ethical issues in design – laws, contracts, liability. Protecting intellectual property – codes of ethics. Detail design, communicating the design - writing the technical report – meeting and oral presentations.

REFERENCE BOOKS
1. Dieter, George E. Engineering Design. --3rd ed. Tata Mcgraw-Hill, New Delhi 2000.
2. Hawkes, Barry and Ray Abinett, Engineering Design for Technicians, Wheeler & Co, Allahabad 1985.
3. Pahl, G. and W Beitz Engineering Design: Systematic Approach --2nd ed. Springer-Verlag, Berlin, 2003.

8. INDUSTRIAL ENGINEERING AND MANAGEMENT

UNIT – I: PLANT ENGINEERING AND PLANT SAFETY

Plant Engineering: Plant – Selection of site of industry – Plant layout – Principles of good layout – types – process, product and fixed position – techniques to improve layout – Principles of material handling equipment – Plant maintenance – importance – Break down maintenance, preventive maintenance and scheduled maintenance.

Plant Safety: Importance – accident – cost and causes of accident – accident proneness – Planning for accident prevention – Safety laws and regulations – Indian factories act 1948 and provision – Industrial disputes – settlement of industrial disputes.

UNIT – II: WORK STUDY, METHOD STUDY AND WORK MEASUREMENT

Work Study: Productivity – Standard of living – method of improving productivity – Objectives – Importance of good working conditions.

Method Study: Definition – Objectives – Selection of a job for method study – Basic procedure for conduct of method study – Tools used – Operation process chart, Flow process chart, two handed process chart, Man machine chart, String diagram and flow diagram.

Work Measurement: Definition – Basic procedure in making a time study – Employees rating factor – Application of time allowances – Rest, Personal, Process, Special and Policy allowances – Calculation of standard time – Problems – Basic concept of production study – Techniques of work measurement.

UNIT – III: PRODUCTION PLANNING AND CONTROL

Production Planning and Control: Introduction – Major functions of production planning and control – Pre planning – Methods of fore casting – Routing and scheduling – Dispatching and controlling – Critical path method (CPM). Production – types – Characteristics – Economic Batch Quantity(EBQ) – Principles of product and process planning – make or buy decision – problems.

Quality Control: Definition – Objectives – Types of inspection – First piece, Floor and centralized inspection – Advantages and disadvantages. Quality control – Statistical quality control – Types of measurements – Method of variables – Method of attributes – Uses of X, R, p and c charts – Operating Characteristics curve (O.C curve) – Sampling inspection – Single and double sampling plan.

UNIT – IV: PRINCIPLES OF MANAGEMENT

Definition of management – Administration – Organization – F. W. Taylor's and Henry Fayol's Principles of Management – Functions of Manager – Types of organization – Line, Staff, Taylor's Pure functional types – Line and staff and committee type – Directing – Leadership – Styles of Leadership – Qualities of a good leader – Motivation – Positive and negative motivation – Just in time – Total Quality Management(TQM) – Quality circle – Zero defect concept – Management Information Systems – Ethics – Professional ethics.

UNIT – V: **PERSONNEL MANAGEMENT**

Responsibility of human resource management – Selection procedure – Training of workers – Apprentice training – On the job training and vestibule school training – Job evaluation and merit rating – objectives and importance – wages and salary administration – Components of wages – Wage fixation – Type of wage payment – Halsey's 50% plan, Rowan's plan and Emerson's efficiency plan – Problems.

TEXT BOOKS:

1. Industrial Engineering and Management - O. P. Khanna
2. Engineering Economics and Management - T. R. Banga & S. C. Sharma

REFERENCE BOOK:

1."Industrial Engineering and Management", S.S.Manian and Rajagobal by Balachitra Pub.,Madurai,2004.

9. Practical I: AUTOCAD LABORATORY

Drawing Ex. Practice (Machine & Assembly Drawing)

1. Sleeve and Cotter joint
2. Socket and spigot joint
3. GIB and Cotter joint
4. Flange Coupling
5. Universal Coupling
6. Machine Vice
7. Swivel Bearing
8. Screw jack
9. Tail Stock

10. Practical II: CAD LABORATORY

3D solid modeling and LISP programming practice

i) Geneva Mechanism
ii) Cast Iron Block
iii) Bearing Block
iv) Bushed Bearing
v) Gib and Cotter joint
vi) Screw Jack
vii) Universal Coupling
viii) Simple LISP programs for drawing the following: rectangle, circle, concentric rectangles, concentric circles, changing the colors and line types

11. Practical III: GRAPHICS LABORATORY

C Programming practice:

1. Study of Graphics primitives.
2. 2D Transformations
3. 3D Transformations
4. Simple Animation.(Bouncing ball,Blinking eyes etc.,)
5. Clipping
6. Viewing Transformation
7. Bresenham's Algorithm for Line drawing, Circle drawing
8. Displaying text in different fonts.