



BHARATI VIDYAPEETH UNIVERSITY, Pune.

(Established under Section 3 of UGC ACT 1956)



PRACTICAL

C O U R S E S T R U C T U R E A N D S Y L L A B U S

**B. Tech. (PRODUCTION)
(Sem. III & IV)**



FIELD WORK



CLASS WORK



COURSE STRUCTURE & SYLLABUS

BHARATI VIDYAPEETH UNIVERSITY, PUNE

B. Tech. (PRODUCTION) (Sem. III & IV)



HIGHLIGHTS

Bharati Vidyapeeth University College of Engineering (BVUCOE) is the largest Engineering College in Maharashtra with an intake of 700 students in each academic year. Imparting quality technical education from Under Graduate to Doctorate Level, BVUCOE is probably the only Engineering College in India with an accreditation from both NAAC as well as NBA. The faculty at BVUCOE boasts of highly qualified academicians, a quality that is further emphasized by the fact that 15 of them are presently pursuing their Ph.D. degree.

BVUCOE has been ranked 29th amongst the Top 50 Technical Schools of India in survey conducted by DATAQUEST-IDC. We have enjoyed a ranking in this list for the last 4 years. Research is of utmost importance in all our programs. A total of 113 research papers were published in the academic year 2007-2008.

Currently we have 12 ongoing research projects. The infrastructure of BVUCOE is state-of-the-art with 62 classrooms, 59 laboratories and a well-stocked library that currently holds 27,130 titles. The college has an international presence with MoUs signed with the North Carolina A&T State University (Greensboro, USA), University of Venice (Italy), Actel Corporation (USA). Corporate interaction is also inculcated in our programs through our association with Oracle India Ltd., Infosys Ltd. and Tata Consultancy Services.

SALIENT FEATURES

Production Engineering Department was established in the year 1983. This is one of few departments to be established in the University of Pune, to which this college was affiliated from 1983 to 2000.

The department is trying to give best of academic & practical knowledge to students right from the inception. The departmental goals are:

Provide Students with a balance of intellectual and practical experiences that enable them to address society needs.

Quality improvement of staff and students for value added education.

Identifying emerging technologies and Design innovate methods for teaching and learning.

Project topics to focus on industrial needs and contribute to economic and social development.

Ensure the highest quality of teaching and learning, led by active research.

Promote Industry-Institute Interaction.

The workshop is the part of Production Engineering Department and it is having 2134 sq.mts area with different facilities spread over three floor.

Basement: Machine Shop, Moulding Shop and Black Smithy.

Ground Floor: Production Shop, Turning Shop, Welding Shop, Advanced Manufacturing Shop.

First Floor: Pattern Making Shop, Carpentry Shop, Tin Smithy Shop, Plumbing Shop, Fitting Shop, Plastic Moulding Shop. The department spreads over a built up area of 3068 sq.mts.

MAJOR GROUPS/AREAS

Manufacturing Processes, Advance Productivity Techniques, Industrial Engineering, Metallurgy, Manufacturing Automation, CAD/CAM, Product Design, Inspection and Testing.

EXPERTISE IN RESEARCH AND CONSULTANCY

Production Engineering Department has received grant of Rs. Five Lakhs from All India Council for Technical Education (AICTE), New Delhi for development of Non-Traditional Machining Processes Laboratory under MODROBS Scheme. Also a DST Project of 18 Lakhs has been received for further research in Non-Traditional Machining processes laboratory.

One of the faculty member has completed Ph.D programme at Indian - Institute of Technology, Kanpur under Quality - Improvement programme (QIP) and one staff member is pursuing Ph.D programme in U.S.A. Two staff members are pursuing Ph.D programme in Bharati Vidyapeeth University.

Our metallurgy lab has all the facilities required for inspection and testing of materials.

MAJOR EQUIPMENTS

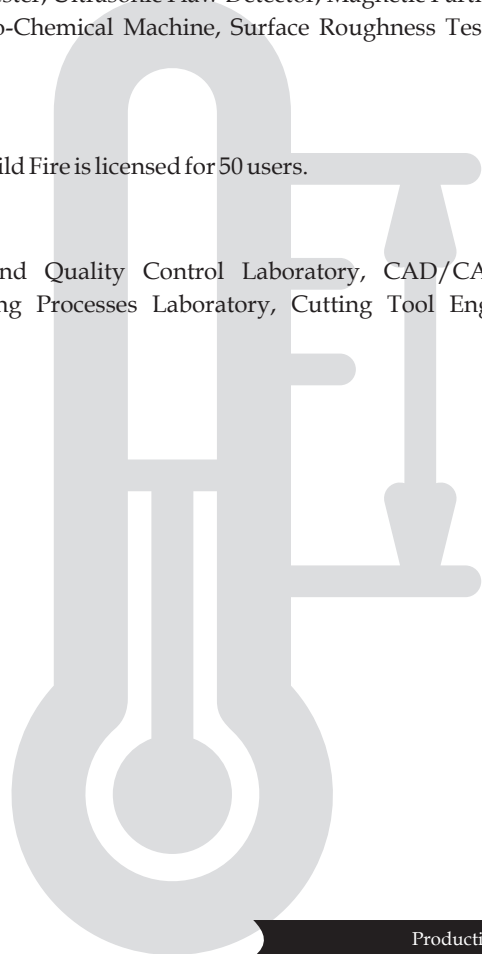
CNC Lathe, CNC lathe trainer, Spark erosion machine, Optical micrometer with CCTV, Vickers cum Brinell Hardness Tester, Ultrasonic Flaw Detector, Magnetic Particle Tester, Spark Erosion Machine, Electro-Chemical Machine, Surface Roughness Tester (Mitutoyo Make).

SOFTWARES

Ideas 10 NX and CATIA V-5 R-II. Proe Wild Fire is licensed for 50 users.

LABORATORIES

Metallurgy Laboratory, Metrology and Quality Control Laboratory, CAD/CAM Laboratory, Non-Traditional Machining Processes Laboratory, Cutting Tool Engg. Laboratory.





STRUCTURE & EXAMINATION PATTERN

B. Tech. - Production Engineering

Semester III								Total Duration : 34Hrs/Week Total Marks : 750	
Subject Code	Subject	Teaching Scheme			Examination Scheme			Total	
		L	P	D	Theory	Unit Test	TW & Or		
K60201	Strength of Machine Elements #	04	02	-	80	20	50	150	
K60221	Industrial Engineering	04	-	-	80	20	-	100	
K60222	Thermal Engineering	04	02	-	80	20	50	150	
K60223	Manufacturing Processes I	04	02	-	80	20	50	150	
K50261	Industrial Electronics & Electrical Technology #	04	02	-	80	20	50	150	
K60261	Machine Drawing & Computer Aided Drafting	02	02	02	-	-	50	50	
Total		22	10	02	400	100	250	750	

Teaching Scheme			Examination Scheme			Total
Lectures	Practical	Drawing	Theory	Test	T. W. & Or.	
22	10	02	400	100	250	750

Semester IV										Total Duration : 31Hrs/Week Total Marks : 750	
Subject Code	Subject	Teaching Scheme				Examination Scheme				Total	
		L	T	D	P	Theory	Unit Test	TW & Pr	TW & Or		
K70208	Engineering Mathematics-III #	04	01	-	-	80	20	-	-	100	
K60224	Manufacturing Processes- II	04	-	-	02	80	20	-	50	150	
K60262	Theory Of Machines	04	-	02	-	80	20	-	50	150	
K60225	Material Science & Composite Materials	04	-	-	02	80	20	-	50	150	
K60226	Design Of Machine Elements	04	-	-	02	80	20	-	50	150	
K60227	Production Practice - I	-	-	-	02	-	-	50	-	50	
Total		20	01	02	08	400	100	50	200	750	

Teaching Scheme				Examination Scheme				Total
Lectures	Practical	Drawing	Tutorial	Theory	Test	T. W. & Pr	T. W. & Or.	
20	08	02	01	400	100	50	200	750



RULES FOR CONDUCTING TESTS

Mode of the test

In each semester for each subject three tests shall be conducted. The schedule for the same will be declared at the commencement of academic year in the academic calendar.

Each test shall carry 20 marks.

University examination pattern has given weightage of 20 marks for the tests.

To calculate these marks following procedure is followed:

- i) Out of the three tests conducted during the semester, the marks of only two tests in which the candidate has shown his/her best performance shall be considered, to decide the provisional marks in each subject.
- ii) Average marks obtained in two tests in which students have performed well, shall be considered as provisional marks obtained by the student in the tests.
- iii) If the candidate appears only for two tests conducted during the semester, he/ she will not be given benefit of the best performance in the tests.
- iv) If the candidate appears only for one test conducted during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in other tests.
- v) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; These marks will be final marks obtained by the student. No scaling up is permitted.
- vi) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.

Paper Pattern for Tests

- i) All questions will be compulsory with weightage as following

Question 1	-	7 marks
Question 2	-	7 marks
Question 3	-	6 Marks
- ii) There will not be any sub-questions.

For granting the term it is mandatory to appear for all the three tests conducted in each semester.

Roll numbers allotted to the students shall be the examination numbers for the tests.



SEMESTER - III



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Simple Stresses & Strain in Machine Parts:

Concept of stress & strain, types of stresses, strains - linear, lateral, shear thermal, volumetric, hooks law, Poison's ratio, modulus of elasticity, modulus of rigidity, bulk modulus, stress-strain diagram for ductile & brittle material, yield strength, ultimate strength, buckling, impact loading, suddenly applied loading, Thermal stresses in machine elements

Unit-II

08 Hours)

Engineering Materials:

Mechanical properties of engineering materials, creep, stress concentration, selection of materials, cast iron, BIS system of designation of steel, plain carbon steel, overseas standards, cast steel, aluminum alloys, die casting alloys, weighted residual method.

Unit-III

(08 Hours)

Principle Stresses:

Normal & shear stresses & strain on any oblique plane, concept of principle planes, derivation of expression of principle stresses & maximum shear stresses, position of principle planes & planes of maximum shear, graphical solution using Mohr's circle, combined effect of axial force, bending & torsion.

Theories of Failure:

Maximum normal stress theory, Maximum shear stress theory, Maximum distortion energy theory, Maximum strain theory, Maximum strain energy theory, their application & limitation to engineering

material, composite member design.

Unit-IV

(08 Hours)

Shear force Diagram & Bending Moment Diagram of Shafts and Beams:

SFD & BMD of shaft with different end conditions, simply supported, cantilever, overhang, with all types loads, concentrated load conditions, torsional deflection of shaft, lateral deflection of shaft by Maculley's method, moment area method, Castigliano's theorem.

UNIT-V

(08 Hours)

Stress Analysis of Knuckle and Cotter Joint:

Bending of curved bars, stresses in ring, chain link, crane hook, eccentric loading, design of knuckle & cotter joint & chain link.

UNIT-VI

(08 Hours)

Threaded and Riveted Joints:

Basic types of screw fastenings, uniform strength bolts, ISO metric screw threads, Eccentrically loaded bolt joint load perpendicular to bolt axis, eccentric load on circular base, cylindrical bolts, turn buckle design.

Term work:

The Journal containing the record of following:

- i) Experiment on Tension test on M. S. bar.
- ii) Experiment on Compression test on M.S. bar.
- iii) Experiment on Shear test on M. S. bar.
- iv) Experiment on Torsion test on M. S. bar.
- v) Experiment on Impact test.

Drawing file containing two half imperial sheets:

- i) Drawing sheet of SFD – BMD of shafts using computer.
- ii) Drawing sheet of Mohr's circle.

Any two assignments based on above syllabus.

Oral

Based on above term work.

Text Books/References

Timoshenko & Young, Engineering Mechanics, Tata McGraw Hill Book Publishing Co. Ltd. 1985

James Gere, Mechanics of Materials, Thomson Learning

S Ramamrutham, Strength of Materials

V B Bhandari, Design of Machine Elements, Tata McGraw Hill Publication

J E Shigley, Mechanical Engineering Design, McGraw Hill

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



K60221: INDUSTRIAL ENGINEERING & MANAGEMENT

TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

Unit-I

(08 Hours)

Management-An Introduction:

Management- Meaning and Definitions, Management, Administration, and Organization concepts, Management as an Art and Science and profession, contribution of various thinkers to management thought, Types and Functions of Management.

Unit-II

(08 Hours)

Organization:

Different forms of business Organization -Individual proprietorship, Partnership, Joint stock company, Co-Operative enterprise, Public Sector, Undertakings, organizational structures in Industries, Line, Functional , Line and functional , Project, Matrix Organization and Committees

Unit-III

(08 Hours)

Financial, Marketing and Personnel Management:

Financial Management-Capital structure, Fixed capital, working capital, sources of finance, cost analysis, Break even analysis, Depreciation and Financial statement.

Marketing Management-Definitions, Marketing and Selling concept, market segmentation, distribution channels ,Market Research, Advertising and sales promotion and Sales forecasting.

Personnel Management-Definitions Recruitment, Selection and training of the employees, Job valuation and Merit rating ,wage administration-different methods of wage payments, incentives.

Unit-IV

(06 Hours)

Method Study:

Steps in method study, tools and techniques used, process chart symbols, flow diagrams, two handed chart, multiple activity chart, use of motion

pictures and its analysis. Simo charts, chorno & cycle graph, developing, presentation, installation and maintenance of improved methods.

Unit-V

(10Hours)

Work Measurement :

Time Study: Aim and objectives , terminology and tools, use of stop watch procedure in making a time study, elements, selection of operations time study forms, handling of foreign elements. Performance rating. Allowances: Personal, Fatigue and other allowances. Analysis and calculation of Standard Time. Determination of number of cycles time study for indirect functions such as Maintenance , Marketing etc., Most Technique.

Works Sampling: Definition, Objectives, theory of Work Sampling. Other applications of work sampling, errors in work sampling study.

Synthetic and Standard data Methods: Concepts, introduction to PMTS, MTM-1, WF, Basic motion time, MTM-2, and other second - generation methods timing of group operations.

Unit-VI

(08Hours)

Ergonomics and Industrial Safety:

Definitions, importance in industry, basic anatomy of human body, anthropometrics, measurement of physical work and its techniques, work and rest cycles, bio mechanical factors environment effects.

Importance of safety, planning, training, safety precautions, safety equipments, Government regulations on safety.

Introduction to Business Process Re-engineering (BPR), Concurrent Engineering, Reverse Engineering, JIT, KANBAN.

Text Books/References

O. P. Khanna, Industrial Engineering & Management, Dhanapat Rai & Sons.

M. C. Shukla, Business Organization and Management, S. Chand & Co. Ltd, New Delhi.

Harold Koontz & Heinz Enrich, Essentials of Management, McGraw Hill International.

M.N.Mishra, Organizational Behavior, Vikas publishing New Delhi.

Dale Yoder, Personnel Management.

Prasana Chandra, Financial Management, Theory & Practice.

Philip Kotler, Marketing Management.

Work Study, ILO.

S. S. Patil, Industrial Engineering & Management, Electrotech Publication.

Mansoor Ali & Dalela, Industrial Engineering & Management System, Standard Publisher distributions.

R. M. Currie, Work Study, ELBS.

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Second Law of Thermodynamics:

Limitations of first law, Heat engine, refrigerator & heat pump, Kelvin -Planks and Clausius statement, Equivalence of Kelvin - Planks and Clausius statement, Perpetual motion machine of second kind, Carnot cycle & Carnot heat engine, Entropy, Principle of increase of entropy. Steam Generators: Classification, Constructional details of Process & Power boilers, boilers mountings & accessories, equivalent evaporation, boiler efficiency, energy balance, boiler controls, boiler draught.

Unit-II

(08 Hours)

Refrigeration:

Systems of refrigeration, unit of refrigeration, reversed Carnot cycle, Bell Coleman cycle, Vapour compression cycle, Superheating and liquid sub cooling, C. O. P and Power requirements, TR Capacity, Use of p-h charts, Desirable properties of refrigerants, CFC & non-CFC & alternative refrigerants, Vapour absorption systems, Comparison of Vapour compression & Vapour absorption systems

Unit-III

(08 Hours)

Air conditioning:

Factors affecting human comfort, mixture of air & vapour, Dalton's law, psychrometry, definitions such as DBT, WBT, Specific humidity, relative humidity, degree of saturation, study of psychrometric chart, different psychrometric process such as sensible heating, cooling, humidification & dehumidification, combination of above process, evaporative cooling, Different Air conditioning systems such as winter, summer, year round, central and unitary, Applications of air conditioning.

Unit-IV

(08 Hours)

Reciprocating Air Compressors:

Introduction, Use of compressed air, construction & working of reciprocating air compressors, P-V diagrams of single stage air compressor, Effect of clearance on it, Volumetric efficiency, Power required to drive the compressor, Isothermal efficiency, Mechanical efficiency, Multi-staging of air compressor with ideal intermediate pressure and perfect inter cooling, Advantages of Multi-staging.

Unit-V

(08 Hours)

Internal Combustion Engine Systems:

Fuel Feeding Systems:

Introduction of carburetors in S.I. engines, Mixture requirements, Solex carburetor, M.P.F.I. system for modern automobile engines, Fuel injection systems in C.I. engines, Bosch fuel injection pump, fuel injectors, Type of nozzles.

Ignition Systems:

Battery ignition, magneto ignition, Electronic ignition systems.

Cooling and Lubrication Systems:

Necessity of cooling, Cooling systems, air cooling, indirect cooling, Thermo-siphon cooling, pressurized water cooling, evaporative cooling. Lubrication system for IC engines, Mist type, pressurized, Wet sump, Dry sump.

Unit-VI

(08 Hours)

Air Standard Cycles:

Introduction to Air Standard cycle, Air Standard otto cycle, Diesel cycle, Dual combustion cycle, comparison of above cycles, Actual cycle

Engine Testing & Performance:

Measurement of I.P, B.P, Rope brake dynamometer, Hydraulic dynamometer, Eddy current dynamometer, Measurement of F.P, Willian's line method, Morse Test, Measurement of fuel & air, Measurement of speed, Heat balance sheet.

Term Work :

Term work shall consists of record of minimum eight experiments of the following:

Study of package boiler/modern boiler.

Study of boilers mountings & accessories.

Study of solex carburetor.

Trail on Reciprocating Air Compressor, to determine Isothermal efficiency, Volumetric efficiency & FAD

Study of Fuel pump & Injector.

Study & Performance test on refrigeration test rig to determine actual, theoretical & relative COP, TR capacity of cooling coils.

Study and test on air conditioning test rig.

Trail on Diesel (computerized) engine to determine heat balance, BP, BSFC, Thermal efficiency, Mechanical efficiency.

Study of ignition system of IC engine.

Test on multicylinder Petrol engine to determine B.P, I.P, Brake thermal efficiency & mechanical efficiency.

Oral

Based on above term work.

Text Books/References

Y. Cengel & Boles, Thermodynamics-An engineering approach, Tata McGraw Hill Publications

C. P. Arora, Engineering Thermodynamics, Tata McGraw Hill Publications

P. L. Ballany, Thermal Engineering, Khanna Publications

Ganesan V., Internal Combustion Engine, Tata McGraw Hill Publications

Arora C. P., Refrigeration & Air-Conditioning, Tata McGraw Hill Publications, New Delhi

M. L. Mathur & R. P. Sharma, A Course in I. C. Engine, Dhanpat Rai & Sons

V. M. Domkundwar, Thermal Engineering, Dhanpat Rai & Co. (P) Ltd.

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Pattern And Mould Making:

Foundry Layout, Foundry departments and sections, Pattern and pattern making, Design and allowances for patterns, Colour codes for patterns, Storage of patterns, Types of moulding, Moulding and core making practice, Types of cores, Core print, Core boxes, Moulding sand and core sands, Ingredients of moulding sand, Sand testing methods and their importance in quality control, Gating risering and their design, Software available

Unit-II

(08 Hours)

Melting And Pouring Practice:

Melting furnaces and their selection, Cupola and its operation, Advantages and limitations, applications, Induction melting furnaces, Advantages, Limitations, applications, Pouring practice and equipments, Ladle technology, Solidification of castings, Strike out, Fettling, Cleaning and Surface preparation of castings, Inspection and testing of castings, Defects in castings.

Unit-III

(08 Hours)

Die Casting Process:

Pressure and gravity die casting, Shell mould casting, Investment casting, Continuous casting, Vacuum casting, centrifugal casting, Applications, Merits and limitations of all, Testing and inspection of die casting, Salvaging of casting, Machinability of castings, Foundry mechanization and automation, Use of robots in foundry, Quality control in foundry, Quality assurance and reliability, Dust problems and pollution control, Export potentials for cast products in Indian context.

Unit-IV

(08 Hours)

Introduction Of Welding Processes:

Classification of welding processes, Surface and edge preparation, Fundamentals including heat and fluid flow in fusion welding, Mass

transfer to base metal in gas, Metal arc welding.

Arc welding processes:

Carbon arc, Submerged arc, Tungsten inert gas (TIG), Metal inert gas (MIT), Electroslag, Plasma arc, Stud welding and related arc welding processes – Theory, Comparison on merits, limitation and applications, Fluxes used in arc welding.

Unit-V

(08 Hours)

Gas Welding And Electric Resistance Welding:

Gas welding – Processes and equipment used, Types of flames, Gas cutting– Merits, demerits and applications. Electric resistance welding – Process and equipment used, Spot, Seam, Projection, Butt, Percussion welding, Tube welding, Electric resistance welding process, its merits, demerits and application.

Unit-VI

(08 Hours)

Other Welding Processes:

Cold, Pressure, Diffusion, Ultrasonic, Explosive, Friction, Forge, Thermit, CO₂, Braze and braze welding, Soldering, Principle, Equipment used, Flux used, Merits demerits and application of the above process. Laser beam welding, Electron beam welding, Welding of dissimilar metals, Welding of polymers, Welding inspection, Welding defects and their Classification. Importance of ASME codes, ISO standards on joining processes.

Term Work

List of experiments (Any Five)

Mechanical test on weldment (weld)- Tension bend, drop weight, tear test.

Moulding and core sand testing (Clay content test, moisture content test etc).

Fluidity test using fluidity spiral pattern

Permeability test.

Green strength mould and Green strength core.

Mould and core hardness test.

List of Assignments (Any Five)

Macro examination of brazing and joint section inspection.

Plasma Arc welding.

TIG MIG or CO₂ Welding to exhibit welding defects such as shrinkage, porosity, and burnout

Sieve analysis of sand

CO₂ Moulding and shell moulding processes.

Oral/Practical

Term work and oral will be based on above syllabus

Text Books/References

O. P. Khanna, A text book of Welding Technology, Dhanpat Rai and Sons

O. P. Khanna, A text book of Foundry Technology, Dhanpat Rai and Sons

P L Jain, Principles of Foundry Technology, Tata Mc Graw-Hill, New Delhi

Steel Casting ASM Hand book, Vol. No. I.

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



K 50261 : INDUSTRIAL ELECTRONICS AND ELECTRICAL ENGINEERING

TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

D.C. Machines:

Construction, generator action, e.m.f. equations, types, shunt, series, compound generators (elementary treatment). Motoring action, types - Shunt and series, significance of back e.m.f., torque - speed equations, torque - armature, current speed - armature current, torque - speed characteristics, different methods of speed control for shunt and series motor, starters of DC motors. Applications Of DC motors

Unit-II

(08 Hours)

Three Phase Induction Motors:

Concept of rotating magnetic field Principle of operation, slip, slip torque equation, torque slip characteristics, Methods of starting of I M , relation between slip, of mechanical power developed and copper loss, efficiency of motor, applications of 3-phase IM

Principle of working, construction and applications (descriptive treatment only) of

- i) Single phase induction motors: Resistance split phase, capacitor split phase and shaded pole motors.
- ii) Special purpose motors: Stepper motors, servomotors, A.C. series motors, Universal motors.

Unit-III

(08 Hours)

Synchronous Machines:

Alternators: Constructional features, salient pole and cylindrical type rotors, synchronous speed. Frequency of induced e.m.f., e.m.f. Equations, winding factors, regulation of an alternator.

(Synchronous impedance method only).

Synchronous motors: Principle of working phasor diagram, effect of variation of load and excitation, methods of starting, general applications,

application as synchronous condensers.

Unit-IV

(08 Hours)

Study of Power Control Devices:

Construction and working of SCR, Triac, Power MOSFET, IGBT, Characteristics and, Triggering circuits using Diac / UJT, simple applications like Controlled rectifiers light dimmers, fan regulators. .Study of UPS (Only block diagram)

Unit-V

(08 Hours)

Linear and Digital ICs:

Introduction to IC Op-Amp (like 741), ideal parameters, open loop and closed loop gain, Op-Amp with negative feedback as a small signal amplifier (e.g. Inverting and non-inverting configurations) Op-Amp as Instrumentation Amplifier, Audio Power Op-Amp. IC's like TBA 810, LM380, Op-Amp as comparator, Op-Amp as wave form generator (Square and ramp), case study of Waveform generator IC such as 8038 or XR 2206. Timing Circuits Using IC 555 as mono stable and astable multivibrator and its applications in Mechanical Engg., sequential timers. Binary and BCD adder, Subtractor, Study of flip-flops, shift registers, counters, applications of digital circuits such as staircase, traffic light, lift controller, sequential controllers, display devices like LED, LCD, opto-isolators and opto-couplers.

Unit-VI

(08 Hours)

Industrial Applications:

Advantage of electrical heating, various methods of heating

- i) Resistance heating: Requirements of heating element materials, various heating element materials, design of Heating elements.
- ii) Induction heating: Core type furnace, Ajax - Wyatt furnace, coreless induction type furnace, high frequency. Eddy current heating.

Dialectical heating: General principles Resistance welding and arc welding transformers, storage welding, RF heating, ultrasonic method of testing of materials, principles at LASER and applications, Use of CRO as display devices for industrial applications.

List of Practical

The Term-work shall consist of record of following experiments (Any Eight)
(4 from Electronics and 4 from Electrical)

Study of UPS Systems: Instruments : UPS Kit, CRO, Dmm

Or

Controlled rectifiers wing SCR with UJT triggering for a lamp load .Instruments :
Power – Scope, DMM

Applications of Op-Amp. Using 741 (Any Two)

i) Square wave generators / ramp. Generator

ii) Instrumentation Amplifier

iii) Op-Amp as comparator and Schmitt trigger

Instruments : Dual trace CRO, Dual power supply, Function
generator

Sequential timer using IC555 and square wave generator.

Instruments : Power supply, Dual trace CRO, stop-watch.

Application of logic gates (one bit comparator) and combinational circuits, e.g.
traffic lights

Combinational lock lift, control, code conversion

Shift register IC 7495 and its application as a sequence generator
OR

Programmable counter (frequency and time measurement).

Instruments for digital experiments, Power supply, dual trace CRO, pulse
generator, DMM

Experiment on CNC programming (to be conducted in workshop)

Speed control of D. C. shunt motor by armature voltage and flux control methods
and study Of D.C. shunt motor starters

Load test on D. C. shunt motor

Load test on D. C. series motors

Regulation of alternator by synchronous impedance method

Load test on three phase induction motor

Regulation of alternator by direct loading method

Study of various single-phase Induction motor

Text Books/References

Boylested and Nastelsky, Electronic Devices and Circuits – PHI

Malvino and other Digital Principles and Applications – McGraw Hill

Allen Mottershed, Electronic Devices and Circuits, PHI

Harish C, Raj : Industrial and Power Electronics, Umesh Pub., Delhi

E Huges, Basic Electrical Engineering, PHI

C. S. Rangan, Sharma, Mahi, Instrumentation, Devices and system, WIE

Curtis Johnson, Process Instrumentation, PHI

Groover and Zeimmers, CAD / CAM, PHI

Pillai S. K., First course in Electrical Drives : Wiley Eastern

H. Cotton Electrical Technology

Openshow Taylor: Utilization of Electrical Energy

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



K60261: MACHINE DRAWING AND COMPUTER AIDED DRAFTING

TEACHING SCHEME

Lectures : 02 Hrs/Week

Drawing : 02 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

T. W. & Or. : 50 Marks

Unit-I

(06 Hours)

Dimensioning Practices:

Terms and Notations, Leader, Extension Lines, Terminations and Origin indication, Functional dimension, Non-functional dimension, Datum dimension, Redundant and auxiliary dimension, Chain dimensioning, Running dimensioning, Co-ordinate dimensioning, Symmetrical or equidistant dimensioning, Methods of dimensioning
Common features: Diameters, Radii, Hole sizes, chamfers, Screw threads, Chords, Arcs, Angles, Spheres, Cylinders, Squares.

Conventional Representation of Machine Components As per SP-46 (1988)

ISO Systems of Tolerancing

Tolerance and Allowances, Unilateral and Bilateral limits, Maximum Material Condition (MMC), Methods of tolerance, Indications of deviations and limits of sizes, Tolerances for linear and Angular dimensions, Types of fits with symbols and applications.

Surface Roughness

Surface feature, Machining symbols, Roughness value (Ra) Roughness grade numbers, Conventional representation on part Drawing, Manufacturing process and Surface finish.

Unit-II

(05 Hours)

Types of joints:

Thread forms and their properties, Standard Tables of ISO Metric Threads, Threads designation, Single and multi start threads, Right and left hand threads, Types of screws, bolt and nuts, Types of nut locking Arrangements, Threaded hole and stud assembly, Set screws, Grubs screws, Screwed Joints Welded Joints, Types of pipes and pipe joints, Flange joint Spigot and socket joints, Cotter joint, Hydraulic pipe joints Screwed and flanged union, Expansion joints, Stuffing box and Gland, Piping Layouts, Conventional representation of pipe fittings.

Unit-III

(04 Hours)

Assembly and Part Drawing:

Production Drawing, Bill of Materials Assembly and Part Drawings, such as: Boiler mounting, Steam engines, Machine tools, Automobile Parts.

Unit-IV

(05 Hours)

Introduction to Computer Aided Drafting:

Working Interface of AutoCAD, Drawing Limits, Creating 2-D Drawing in AutoCAD, AutoCAD commands, Editing commands in AutoCAD, Dimensioning in AutoCAD, Creating text in AutoCAD, Changing object properties Scale, Object Snap Mode, Display control in AutoCAD, Layer.

Unit-V

(04 Hours)

3-D Drawing, Surface Modeling:

Introduction, WCS, View Point, UCS, Working with UCS, Orthographic Views Surface Modeling: Box, Wedge, Pyramid, Cone, Sphere, Dome, Dish

Unit-VI

(02 Hours)

Introduction to Solid Modeling:

Box, Wedge, Cylinder, Cone, Sphere, Extrude, Revolved, Slice section, Union, Subtract.

Term Work

First sheet based on dimensioning practice, conventional and symbols in machine drawing

Two Drawing Assignments based on Assembly and Details of Machine Parts, Automobile parts, Engine, Boiler parts etc. (One Drawing assignment preferably on AutoCAD)

Six AutoCAD drawing assignments

Oral

Termwork and oral will be based on above syllabus

Text Books/References

Engineering Drawing Practice for School and Colleges, 1988, SP 46

George Omura, The ABC's of AutoLisp, BPB Publications, 1990, New Delhi

Warren J. Luzadder and Jon M. Duff, Fundamentals of Engineering Drawing, PHI Pvt.

Ltd., 11th edition, 1995, New Delhi

K. L. Narayana, P. Kannaiah and K. Venkata Reddy, Machine Drawing, New Age Int. (P) Ltd., 2nd edition, 1999, New Delhi

N. D. Bhatt and V. M. Pancha, Machine Drawing, Charotar Publishing House, 33rd edition, 2000, Anand

R. B. Gupta, Machine Drawing, Satya Prakashan, 7th edition, 2000, New Delhi

P. S. Gil, Machine Drawing, S. K. Kataria & Sons, 17th edition, 2004, Delhi

N. Sidheswar, P. Kannaiah and V. V. S. Sastry, Machine Drawing, Tata McGraw Hill, 28th reprint, 2004, Delhi

N. D. Junnarkar, Machine Drawing, Pearson Education (Singapore) Pvt. Ltd., 1st edition, 2005, Delhi

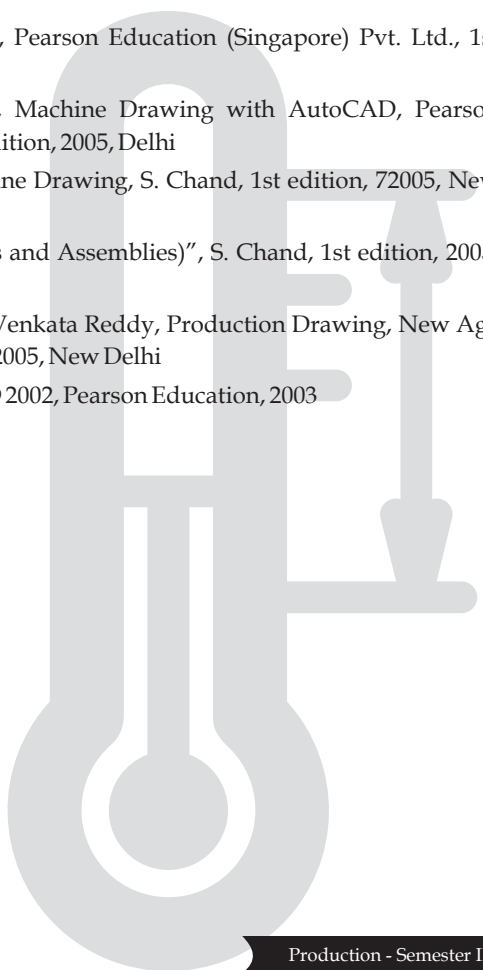
Goutam Pohit and Goutam Ghosh, Machine Drawing with AutoCAD, Pearson Education (Singapore) Pvt. Ltd., 1st edition, 2005, Delhi

R. K. Dhawan, A Text Book of Machine Drawing, S. Chand, 1st edition, 72005, New Delhi

P. H. Joshi, Drawing Machines (Parts and Assemblies)", S. Chand, 1st edition, 2005, New Delhi

K. L. Narayana, P. Kannaiah and K. Venkata Reddy, Production Drawing, New Age Int. (P) Ltd., 1st edition, 1997, Reprint 2005, New Delhi

Engineering Graphics with Auto CAD 2002, Pearson Education, 2003





SEMESTER - IV



TEACHING SCHEME

Lectures : 04 Hrs/Week

Tutorials : 01 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

Unit-I

(08 Hours)

Differential equations:

Solution of Linear differential equation of n^{th} order with constant coefficients, Method of variation of parameters, Cauchy's (Homogeneous type) and Legendre's linear equations.

Simultaneous linear differential equations, Total differential equation, Symmetrical Simultaneous differential equations.

Unit-II

(08 Hours)

Applications of differential equations:

Application to mass spring systems with coupled masses, equivalent electrical circuits. Solution of multi degree of freedom systems (Vertical and Horizontal) by matrix method, Natural frequencies and normal modes of vibration.

Applications of Partial differential equations:

Solution of wave equation, one and two-dimensional heat flow equation by method of separating variables. Application to mechanical and allied engineering problems.

Unit-III

(08 Hours)

Transforms:

Fourier transforms: Fourier integral theorem, Fourier sine and cosine integrals, Fourier Transform, Fourier sine and cosine transforms, Inverse Fourier transforms, Solution of boundary value problems using Fourier transform (Diffusion equation only).

Laplace Transform: Definition, Properties and Theorems, Inverse Laplace transform, Methods of finding inverse Laplace transform, Application to solution of linear differential equations.

Unit-IV

(09 Hours)

Statistics and Probability:

Measures of central tendency, Standard deviation, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates.

Probability density function and probability mass function, Binomial, Poisson's, Normal and Hypergeometric distributions, Test of Hypothesis: Chi-Square test of goodness of fit and Independence of attributes, Introduction to Decision and Quality control.

Unit-V

(09 Hours)

Vector Differentiation:

Radial, Transverse, Tangential, Normal components of linear velocity and acceleration, Gradient, Divergence and Curl, Directional derivative, vector identities Irrotational and Solenoidal Vector fields.

Unit-VI

(08 Hours)

Vector Integration:

Line integral, Surface integral and Volume integral, Work done, Gauss-Divergence theorem, Stoke's theorem and Greens lemma.

Applications to fluid flow, Streamline's, Continuity equation, Motion equation and Bernoulli's equation.

Text Books/References

Wylie C. R. and Barrett L. C., Advanced Engineering Mathematics, McGraw-Hill

M. D. Greenberg, Advanced Engineering Mathematics, 2e, Pearson Education

B. S. Grewal, Higher Engineering Mathematics, Khanna Publication, Delhi

P. N. Wartikar and J. N. Wartikar, Applied Mathematics (Volume I & II), Vidyarthi Griha Prakashan

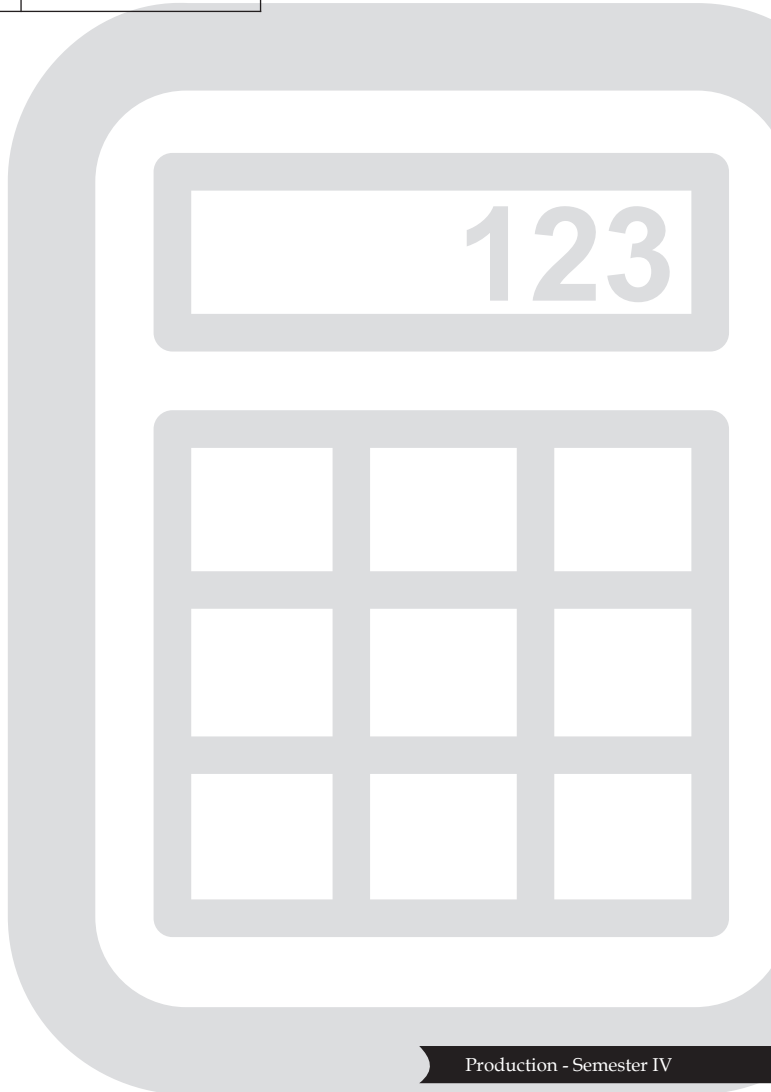
Irwin Miller and John E. Freund, Probability and Statistics for Engineers, Prentice-Hall of India

Peter V. O'Neil, Advanced Engineering Mathematics, 5e, Thomson learning

Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd

Syllabus for Unit Test

Unit Test 1	Unit I & IV
Unit Test 2	Unit II & V
Unit Test 3	Unit III & VI





TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Lathe, capstan and turret lathe:

Introduction, function, types, specification of lathe machines, construction accessories, attachments, operations Tool Geometry. Difference between capstan and turret and engine lathe, turret indexing mechanism, Bar feeding mechanism, work holding devices, tool holding devices, turret tooling layout.

Unit-II

(08 Hours)

Drilling and milling machines:

Types, construction, spindle assembly operation & applications. Fundamentals of milling process, Specification of Drilling and Milling Machines, cutters-types and geometry, operations performed on milling & drilling machines. Dividing head, methods of indexing. Gear train calculations for helical and cam milling.

Unit-III

(08 Hours)

Abrasive machining processes and Surface Treatment Process:

Abrasive machining, abrasive-types, size and geometry. Specifications of Grinding, grinding wheels, wheel marking, wheel selection. Wheel mounting. Types of grinding machines, Grinding faults, Honing, lapping, super finishing, buffing, burnishing process. Electroplating, phosphating, metal spraying, anodizing, shot Peening. Effects of surface treatment processes.

Unit-IV

(08 Hours)

Gear Manufacturing & Thread Manufacturing:

Gear cutting processes, forming and generation, gear cutting on milling machine, gear hobbing, gear shaping, gear shaving, gear grinding. Specifications of gear and thread manufacturing machines.

Thread cutting, internal and external, chasers, dies, thread milling, thread

rolling, thread grinding, thread whirling.

Unit-V

(08 Hours)

Broaching & Numerical control and Machining Centers:

Types of broaching machines - Horizontal, vertical pull up, pull down broaching machines. Broaching machines parts and their function, components machined on broaching machines broach geometry. Introduction to NC. CNC, DNC machines, comparison between NC conventional machine tools, basic principles of NC machine, tolling requirements, Advantages of NC machines, Introduction to machining centers.

Unit-VI

(08 Hours)

Non Conventional Methods of Machining :

Difference between conventional and non conventional machining, Introduction to chemical machining, Electric discharge machining, Electron beam machining, Ion beam machining, plasma arc machining, Laser cutting and welding, Abrasive jet machining, Ultrasonic machining.

Term Work

Experiments and assignment:

- Study and demonstration of ECM and EDM machine.
- Study and demonstration of NC and CNC machine programme.
- Study of Gear generating process on milling machine.
- Study of dividing indexing mechanism.
- Study of Single point cutting tool, Twist drill, Milling cutter
- 6 Assignments based on above syllabus & Industrial visit

Oral

Termwork and oral will be based on above syllabus

Text Books/References

- Roy A. Lindberg, Process & Materials of Manufacture, PHI
- P. C. Sharma, Production Engineering, S. Chand Publications
- R. K. Jain, Production Technology, Khanna Publishers

E. P. DeGrmo, J. T. Black and A. Kosher, Material and processes in manufacturing, PHI
Kundra, Rao, Tiwari, Computer Aided Manufacturing, TMH Publications
Pabla, Adithan, CNC Machines, New age International (P) Ltd.
Amitabh Ghosh, Malik, Manufacturing Science, East West Publications
HMT Handbook, Production Technology, TMH
Hajra Chaudhari, Workshop Technology, Vol.-II

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 04 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Basic Concept and Definition:

Link - Binary, ternary, quaternary, Structure, Machine, Mechanism, Kinematic pair - Classification, Kinematic Chain and Mechanism - Grubler's criteria for movability of chains and mechanism as locked constrained, Unconstrained based on grubler's criteria, Inversion of single slider and double slider crank chain. Inversion of four bar mechanism.

Unit-II

(08 Hours)

Mechanism with lower Pair:

Study of Pantograph, Study of exact straight line motion mechanism, Study of approximate straight line motion mechanism, Steering Gear Mechanism, Hook's or Universal joint, Ratchets and Escapement Mechanism, Swinging / Rocking Mechanism, Indexing Mechanism.

Unit-III

(08 Hours)

Velocity and Acceleration Analysis:

Instantaneous centre method to determine velocities, Methods of locating Instantaneous center, Kennedy's theorem of three centers, Body and space Centroides, Relative velocity and Relative acceleration Method, Coriolis component of acceleration, Klien's construction, Approximate analytical method for velocity and acceleration.

Unit-IV

(08 Hours)

Gear Manufacturing & Thread Manufacturing:

D'Alemberts Principle, Radius of gyration of rigid bodies, Theory of compound pendulum, Bifillar, Trifillar Suspension, Dynamically equivalent system, correction couple, Inertia in I.C. Engine Mechanism by analytical and graphical Method.

Type, Number and Dimensional Synthesis, Function Generation, Path Generation and Body Guidance, Two position synthesis of slider crank

mechanism, Two position synthesis of crank and rocker mechanism, Inertia of Geared system.

Unit-V

(08 Hours)

Balancing:

Balancing of rotating masses in one and several plane, Balancing of reciprocating masses in single and multi-cylinder engine, Inline, Radial and V-type Engines, Primary and Secondary Balancing Analysis, Concept of Direct and Reverse Crank, Static and Dynamic Balancing machine.

Unit-VI

(08 Hours)

Cam and Follower:

Cam Mechanism and its uses, Types of cam and follower, Main consideration affecting choice of cam profile, Determination of Cam profile for given follower motion, Analysis of cam with specified contours – Circular arm cam, tangent cam, cycloidal cam, Kinematic equivalent system.

Term Work

A journal consisting of –

Experimentation on

- i) Determination of Moment of inertia by Bifilar/Trifillar Suspension Method.
- ii) Compound Pendulum.
- iii) Experimental verification of displacement relation of different shaft angle for single Hooke's joint

Assignment

- i) Developing a computer program for velocity and acceleration analysis of slider crank mechanism / Four bar mechanism
- ii) Study of steering gear mechanism

Drawing sheets (Half imperial size)

1. Graphical solution of problem on Velocity and acceleration Mechanism by:
 - i) Velocity by Instantaneous centre method.
 - ii) Relative velocity and Relative acceleration method.
 - iii) Coriolis component of acceleration.
2. Straight line Mechanism.

3. Inertia force analysis using graphical method.
4. Draw cam profile for various types of follower motion.

Oral/Practical

Termwork and oral will be based on above syllabus

Text Books/References

Thomas Bevan, Theory of Machine, CBS Publication

J. E. Shingley, Theory of Machine, McGraw Hill

John Hannah and R. C. Stephens, Mechanics and Machines – Advanced theory and examples, Edward Arnold

R. S. Khurmi and J. K. Gupta, Theory of Machines – Eurasia Publishing House

S. S. Rattan, Theory of Machines - McGraw Hill

Abdulla Shariff, Theory of Machine – Dhanpat Rai Publication

P. L. Ballney, Theory of Machines – Khanna Publications

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



K60225: MATERIAL SCIENCE AND COMPOSITE MATERIALS

TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(06 Hours)

Crystal Structure of Metals and Plastic Deformation:

Study of crystal structure, Indexing of planes and directions, Imperfections in crystals, Mechanism of plastic deformation, Critical resolve hear stress, Deformation of single crystal and polycrystalline metals, Work Hardening , Cold and hot working, Annealing and re crystallization.

Unit-II

(08 Hours)

Mechanical Testing of Metals:

Study of destructive testing Tensile test , Engineering stress and true stress strain, evolution of properties, Numerical based Tensile test, Hardness testing such as Brinell, Rockwell, Vickers and Micro hardness test, Impact test, Fatigue test, Creep test, Cupping test, Non Destructive testing such as Liquid dye penetrate test, Magnaflux test, Eddy current test , Ultrasonic testing and Radiography testing.

Unit-III

(06 Hours)

Study of Equilibrium Diagrams:

Related terms and their definitions, Hume Ruther's rule of solid solubility, Allotropy and polymorphism, Solidification, Dendritic growth, Cooling curves, Plotting of Equilibrium diagrams, Lever rule, Coring, Isomorphs system, Eutectic system, Partial eutectic and eutectoid system, Non Equilibrium cooling and it's effects.

Unit-IV

(10 Hours)

Powder Metallurgy:

Introduction, Advantages and limitations of powder metallurgy, Production of metals powder, Characteristics of powder, Powder conditioning, Powder Compacting, Sintering and sintering furnaces, Production of powder metallurgical parts such as self lubricating bearings,

ferrites, electric contact materials, Carbide cutting tools etc.

Unit-V

(10 Hours)

Study of Composite Materials and Ceramic:

Introduction, Classification of composites, Types of composite, Properties, Metal matrix composite, Ceramic matrix composite, Fiber Reinforced plastic, Manufacturing methods, Applications in Different field. Ceramic, Properties and applications of ceramics. Manufacturing of ceramics.

Unit-VI

(08 Hours)

Corrosion and Prevention:

Introduction, Types of corrosion, Oxide film growth laws, Action of hydrogen, Polarization, Stress corrosion, Season Cracking, Prevention of corrosion, Design of component, Modification of environment, Cathodic Protection, Deposition and coating, Ion Implantation, PVD, CVD, Powder coating etc.

Term Work:

List of practical: (Any Eight)

Tensile test to determine strength and other mechanical properties

Hardness test Brinell and Vickers

Rocwell and Poldi hardness test

Micro-Hardness test

Erichsen Cupping test

Magnetic Particle test

Liquid penetrate test

Ultrasonic Test

Visual inspection of casting and welded components.

Oral

Term work and oral will be based on above syllabus

Text Books/References

Dr. V. D. Kodgere, Material Science and Physical Metallurgy, Everest Publication, Pune

S. H. Avner, Physical Metallurgy, Tata Micro hill Publication, Delhi
O. P. Khanna, Material Science and Metallurgy, Khanna Publication , Delhi
R K Rajput, Material Science and Engineering, S K Kataria and Sons Publication, Delhi
Calliste, Material Science and Engineering

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



TEACHING SCHEME

Lectures : 04 Hrs/Week

Practical : 02 Hrs/Week

EXAMINATION SCHEME

Theory : 80 Marks

Duration : 03 Hours

Unit Test : 20 Marks

T. W. & Or. : 50 Marks

Unit-I

(08 Hours)

Design of levers, Shafts, keys, coupling:

Transmission shafts, shaft design on strength basis, shaft design on torsional rigidity basis, ASME code for shaft design. Design of shaft on basis of lateral rigidity, Introduction to castigliano's theorem.

Keys, saddle, sunk, feather and woodruff keys. Design of flat, square, kennedy keys and splines.

Couplings, Design of muff coupling, flange coupling, flexible bushed pin coupling

Unit-II

(08 Hours)

Springs:

Types, application and material, stress deflection equation for helical spring, styles of ends, design of helical compression spring, multileaf spring, springs in series and parallel.

Power screws :

Forms of threads, multiple threaded screws, torque analysis with square and trapezoidal threads, self locking screws, collar friction, torque, stresses in power screw, screw jacks and c-clamp design, construction and application of recirculating ball screw.

Unit-III

(10Hours)

Clutch:

Types classification and selection of friction clutches, torque transmitting capacities and design of single and multiplate clutch, cone, centrifugal clutches, Types of friction materials and their advantages, limitation.

Brakes:

Energy absorbed by brakes, design considerations block brakes, pivoted block brakes, internal expanding shoe brake, disk and band –brake.

Unit-IV

(06 Hours)

Rolling contact bearing:

Types, static and dynamic load carrying capacities, stibek's equation. Equivalent bearing load, load life relation ship, selection of bearing life, selection of rolling contact bearing from manufacture's catalogue.

Bearing with probability of survival other than 90%, lubrication and mounting of bearings, construction, selection and materials of oil seals, gaskets. Pre-loading of rolling contact bearing.

Sliding Contact Bearing:

Only introduction

Unit-V

(08Hours)

Belt, chain and rope drives:

Belt drives construction and material of belt, comparison between flat belts and V belts, law of belting and types of belt drives, power rating of belts, maximum power condition, selection of flat and V belts, belt tensioning methods, relative advantages and limitations of flat and V belts, construction and applications of timing belt

Construction and application of roller chains, length of chain and number of links, polygonal effect, power rating of chains, constructions of sprocket wheels, silent chains, relative advantages and limitation of chain drive.

Rope drives-construction of wire ropes, lay of wire ropes stresses in wire ropes, selection of wire ropes, rope drum construction and design.

Unit-VI

(08 Hours)

Fatigue design:

Design of components subjected to fatigue loading, reversed load and infinite life, reverse load and finite life, fluctuating load and infinite life, soderberg criterion, Goodman criterion, modified Goodman diagram, Grubler criterion, fluctuating load and finite life, fatigue design under combined stresses, fatigue design of bolted joints, fatigue design of helical springs, cumulative damage in fatigue.

Term Work

Six assignments on above topics.

A design project: consisting of two imperial size sheets - one involving assembly drawing and part list and overall dimension and other sheet involving drawing of individual components. Manufacturing tolerances, surfaces symbols and geometric

tolerances should be specified so as to make it working drawing. A design report making all necessary calculations of design of components and assembly should be submitted along with the above assignments.

Oral

Based on above term work.

Text Books/References

Shigley J. E. and Mischke C. R., Mechanical Engineering Design, MCgraw Hill publication Co. Ltd.

Spott M. F. and Shoup T. E., Design of Machine Elements, Prentice Hall International

Bhandari V. B., Design of Machine Elements, Tata MCgraw Hill Publication Co. Ltd.

Black P. H. and O. Eugene Adams, Machine Design, MCgraw Hill Publication Co. Ltd.
Design Data, PSG College of Technology, Coimbatore

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI



TEACHING SCHEME

Practical : 02 Hrs/Week

EXAMINATION SCHEME

T. W. & Pr. : 50 Marks

Term Work

Each candidate shall be required to complete and submit the following jobs:

1. Welding-TIG / MIG /Resistance (One Job)
2. Pattern making:
A split pattern consisting of wood turning or a core box. (One Job)
It should follow the colour code in pattern making..
3. Plain turning, step turning, taper turning, facing, knurling. (One Job)

Note

Practical examination of 3 hours duration based on above termwork will be conducted at the end of semester.



RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

A. T. K. T.

A candidate who is granted term for B.Tech. Semester-I will be allowed to keep term for his/her B.Tech. Semester-II examination even if he/she appears and fails or does not appear at B.Tech. Semester-I examination.

A candidate who is granted term for B. Tech. Semester - III will be allowed to keep term for his/her B.Tech. Semester-IV examination even if he/she appears and fails or does not appear at B.Tech. Semester-III examination.

A candidate who is granted term for B.Tech. Semester-V will be allowed to keep term for his/her B.Tech. Semester-VI examination if he/she appear and fails or does not appear at B.Tech. Semester-V examination.

A candidate who is granted term for B.Tech. Semester-VII will be allowed to keep term for his/her B.Tech. Semester-VIII examination if he/she appears and fails or does not appear at B.Tech. Semester-VII examination.

A student shall be allowed to keep term for the B.Tech. Semester-III course if he/she has a backlog of not more than 3 Heads of passing out of total number of Heads of passing in theory examination at B.Tch. Semester-I & II taken together.

A student shall be allowed to keep term for the B.Tech. Semester-V of respective course if he/she has no backlog of B.Tech Semester-I & II and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 heads of passing in termwork and practical examination or termwork and oral examination.

A student shall be allowed to keep term for the B.Tech. Semester-VII course if he/she has no backlog of B.Tech. Semester-III & IV and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 Heads of passing in termwork and practical examination or termwork and oral examination.

CONTINUOUS ASSESSMENT

In respect of Term work at B.Tech. Semester-I & II, B.Tech. Semester- III & IV and B.Tech. Semester-V & VI, target date shall be fixed for the completion of each job, project experiment or assignment as prescribed in the syllabus and the same shall be collected on the target date and assessed immediately at an affiliated college by at least one pair of the concerned teachers for the subject and the marks shall be submitted at the end of each term to the Principal of the college.

Termwork and performance of Practical/Oral examination shall be assessed on the basis of the depth of understanding of the principles involved, correctness of results and not on ornamental or colorful presentation.

For B.Tech. Semester-VII & VIII, termwork assessment will be done by external and internal examiners jointly during the examination schedule declared by the university. The record of continuous assessment shall be made available to the examiners during Term work and practical and Term work and oral examinations. Examiner shall use this record for overall assessment of the performance of the student. Every practical/termwork assignment shall be assessed on the scale of 20 marks and weightage of 20 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	04
2	Presentation	06
3	Understanding	10

Marks obtained out of 20 for all assignments together will be converted on scale of marks assigned to term work of respective subject in the structure of the course.

CLASS

The class should be awarded to the student on the basis of aggregate marks obtained together in both the semesters of the respective year by him. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or marks but less than 66%	First Class
C	Aggregate 55% or more marks but less than 60%	Higher Second Class
D	Aggregate 50% or more marks but less than 55%	Second Class
E	Aggregate 40% or more marks but less than 50%	Pass Class