

IIIrd to VIIIth Semester B.E.
Production Engineering

Prospectus No. 09179

संत गाडगे बाबा
अमरावती विद्यापीठ
SANT GADGE BABA
AMRAVATI UNIVERSITY

(FACULTY OF ENGINEERING & TECHNOLOGY)

PROSPECTUS

PRESCRIBED FOR
FOUR YEAR DEGREE COURSE
BACHELOR OF ENGINEERING
PRODUCTION ENGINEERING
III TO VIII SEMESTER
EXAMINATIONS, 2008-2009
SEMESTER PATTERN



2008

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SYLLABUS**PRESCRIBED FOR****THIRD TO EIGHTH SEMESTER****B. E. EXAMINATIONS****PRODUCTION ENGINEERING****SEMESTER PATTERN****THIRD SEMESTER****3SMP 1****MATHEMATICS-III****SECTION-A**

UNIT-I : Ordinary differential equations:- Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy's and Legendre's linear differential equations. (10 Hrs.)

UNIT-II Laplace transforms : Definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function. Solution of Linear differential equations. (10 Hrs.)

UNIT-III a) Partial differential equation of first order of following form-
(i) $f(p,q)=0$; (ii) $f(p,q,z)=0$; (iii) $f(x,p)=g(y,q)$; (iv) $Pp+Qq=R$ (Lagrange's form); (v) $z=px+qy+f(p,q)$ (Clairaut form)
b) Statistics : Curve fitting by method of least squares (Straight and parabola only), Correlation, Regression.
Binomial, Poisson and Normal Distribution (10 Hrs.)

SECTION-B

UNIT-IV Complex Analysis :- Functions of complex variables, Analytic function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne's method, conformal mappings (translation, rotation, magnification, inversion, bilinear transformation), singular points, expansion of function in Taylor's and Laurent's series. Cauchy's integral theorem and formula, Residue theorem. (12 Hrs.)

UNIT-V Numerical Analysis : Solution of algebraic and transcendental equations by Newton-Raphson method & method of false

position. Solution of system of linear equations by Gauss-Seidal method, Relaxation method. Solution of first order ordinary differential equations by Picards, modified Euler's, Runge-Kutta and Taylor's method.

UNIT-VI Vector Calculus :- Scalar and vector point functions, Differentiation of vectors, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, line, surface, volume integrals, irrotational and solenoidal vector fields, Stoke's and Divergence theorem (without proof). (10 Hrs.)

BOOKS RECOMMENDED :-

- 1) Elements of Applied Mathematics by P.N. Wartikar and J.N. Wartikar
- 2) A Text Book of Differential Calculus by Gorakh Prasad.
- 3) Engg. Mathematics by Chandrika Prasad.
- 4) Advancing Engg. Mathematics by E.K. Kreyzig.
- 5) A Text Book of Applied Mathematics by P.N. Wartikar and J.N. Wartikar.
- 6) Higher Engg. Mathematics by B.S. Grewal.

3SMP2**MECHANICS OF MATERIAL****SECTION-A**

Unit-I 1. Mechanical properties: Concept of direct, bearing and shear stresses and strains, stress-strain relations, Biaxial and triaxial loading, elastic constants and their relationship, stress-strain diagrams and their characteristics for mild steel, and other metals, factor of safety,

2. Uniaxial stresses and strains: Stresses and strains in compound bars in uniaxial tension and compression, temperature stresses in simple restrained bars and compound bars of two metals only.

Unit-II 1. Axial force, shear force & bending moment diagrams: Beams, loading and support conditions, bending moment, shear force and axial load diagrams for all types of loadings for simply supported beams, cantilevers and beams with overhangs, relation between shear force, bending moment and loading intensity.

2. Simple or pure bending theory: Theory of simple bending, section modulus, moment of resistance, bending stresses in solid, hollow and built up section, leaf springs.

Unit-III 1. Torsion: Theory of torsion & assumptions, derivation of torsion equation, polar modulus, stresses in solid & hollow circular shaft, power transmitted by shaft, closed coiled helical spring with axial load.

2. Shear stress distribution on beam cross sections.

SECTION - B

- Unit-IV 1. Thin and thick cylinders and thin spherical shells subjected to internal pressures.
2. Strain energy under uniaxial tension and compression impact loads and instantaneous stresses.
- Unit -VI. Combined direct & bending stresses: Combined direct and bending stresses, applications to short columns with eccentric loads.
2. Principal stresses: Biaxial stress system, principal stresses, principal planes, Mohr's circle of stresses, principal strains.
- Unit-VI 1. Deflection of beams
Deflection in statically determinate (simply supported, cantilever and beams with overhang) beams subjected to point loads, uniformly distributed loads, moments by double integration, and Macauley's method.

Practical:

Minimum seven out of following:

1. Tension test on metals.
2. Compression test on materials.
3. Shear test on metals.
4. Impact test on metals.
5. Hardness test on metals.
6. Torsion test on metals.
7. Deflection of beams.
8. Modulus of rupture test.
9. Buckling of columns.
10. Deflection of springs.

A journal/report on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on above practical and the syllabus of the course.

BOOKS RECOMMENDED:

1. E.P.Popov, Mechanics of Materials: Prentice Hall of India, New Delhi.
2. S. Timoshenko and O.H.Young: Elements of Strength of Materials. East West Press Private Ltd., New Delhi.
3. Ferdinand L. Singer, Strength of Materials: Harper and Row, N.Y.
4. Shames, I. H., Introduction to solid mechanics: Prentice Hall of India, New Delhi, 1990.
5. Natarajan, Mahadeoappa, Strength of Materials
6. Junnarkar, S. B., Mechanics of Materials
7. Mubeen, A., Mechanics of Solids, Pearson Education (Singapore) Pvt. Ltd.
8. Beer and Johnston, Mechanics of Materials, Mc-Graw Hill.

FLUID POWER AND SYSTEMS**SECTION-A**

- 3SP3
- UNIT-I: Introduction to study of fluid motion, different properties of fluid, fluid pressure and its measurement., hydrostatic on plane and curved surfaces.
- UNIT-II: Fundamentals of fluid flow, types of fluid flow, continuity equation, equation of motion and energy equation, forces acting on fluid in motion, Eulers equation and Benoullis equation, flow through pipes and its losses, losses in fittings. (9)
- UNIT-III: Application of Bernoullis equation to venturimeter, meter, nozzle meter etc. pitot tube theory and application.
Introduction to laminar and turbulent flow, Reynolds number and its significance, Flow through notches and orifice and flow measuring devices.

SECTION-B

- UNIT-IV: Pumps:- Basic theory, working Principle and characteristics of variable capacity and fixed capacity type pumps, gear, vane, piston, rotary and axial piston pumps, Reciprocating pumps. (9)
- UNIT-V: Valves :- Check Valve, Operation and Selection, pressure relief valve principal types, speed and pressure valves, Differential pressure control valves, simple hydraulic ckts using these components.
- UNIT-VI: Hydraulic systems :-
1. Function and application of : Hydraulic accumulation, differential hydraulic accumulator, intensifier, ram, lift riveter, crane.
 2. Hydro Kinetic system such as fluid coupling and torque convertors.
 3. Fluid, drives for machine tools such as lathe, drilling machine and shaper.

PRACTICAL TERM WORK :

Atleast Ten experiments based on above syllabus as given below.

- 1) Pressure measurements by manometers.
- 2) Coefficients of discharge for venturimeter.
- 3) Verification of Bernoulli's equation.

- 4) Forces of impact of jet.
- 5) To find Reynolds number of a flow and its critical velocity.
- 6) To find C_c , C_v and C_d for flow through orifice.
- 7) To find coefficient of discharge of a given notch.
- 8) Frictional losses through pipe and fittings.
- 9) Trial on reciprocating pump.
- 10) Trial on Centrifugal pump.
- 11) Trial /Study of Gear pump.
- 12) Study on Vane pump.
- 13) Study of piston pump.
- 14) Trial/Study of Hydraulic Ram.
- 15) Study of Valves.
- 16) Study of various Hydraulic Circuits.

3SP4 THERMAL POWER ENGINEERING

SECTION - A

- UNIT I :- Basic concepts - Thermodynamic systems, control volume, properties and state of a system. Point and path function, processes and cycles, difference between work and heat, Ideal gases and vapours, ideal gases, gas laws, equation of state, gas constant. Universal gas constant. (7)
- UNIT II :- Laws of thermodynamics :- Law of conservation of mass & energy, laws of thermodynamics, work done, change in internal energy & Heat transfer during non-flow Processes. Introduction to entropy. (8)
- UNIT III :- (a) properties of steam :- Triple point, critical point, sensible heat, latent heat, superheat & total heat of steam. Sp. Volume, internal energy, external work of evaporation, dryness fraction & its determination, entropy of steam.
- (b) Boilers :- Classifications, Babcock _ Wilcox & Lancashire Boiler. Mountings & accessories. (8)

SECTION - B

- UNIT IV :- Otto, Diesel cycles : IC Engines :- Classification - two stroke, four stroke petrol and diesel engines, Ignition system, cooling system, fuel injection system, Governing of IC Engines, calculation of Power developed and efficiency. (7)
- UNIT V :- Rankine & Modified Rankine cycle. : Steam Turbine :- Flow of steam through nozzles, critical pressure ratio, maximum discharge, throat and exit areas; classification of steam

turbines, velocity diagram, calculation of work done, power development, axial thrust & efficiency, Compounding and governing of steam turbines. (8)

Unit VI : Air Compressors :- Reciprocating and rotary compressors, working principles and applications, calculations of efficiency and work done for single stage reciprocating compressors.

Gas Turbine :- Classification, such as open and close cycle turbines. Brayton cycle, methods to improve efficiency. (7)

LIST OF PRACTICALS :-

(Atleast ten based on above syllabus such as following)

- 1) Study of Water tube boiler.
- 2) Study of Fire tube boiler (Two Types)
- 3) Study and Trial of a domestic refrigerator.
- 4) Study of steam turbine.
- 5) Study of Simple Steam power plant.
- 6) Study of two stroke and four stroke I.C. Engines.
- 7) Trial on I.C. Engine.
- 8) Study and trial on a reciprocating air compressor.
- 9) Study of a rotary air compressor.
- 10) Study of Gas turbine.
- 11) Determination of Dryness Fraction of steam.
- 12) Study of Thermodynamic cycles.

BOOKS :-

- 1) Thermal Power Engineering by Mathur and Mehta.
- 2) Thermal Power Engineering by Yadav.
- 3) Thermodynamics for Engineering by B.V.Ka

3SMP5 MANUFACTURING PROCESSES - I

SECTION - A

- Unit-I :- Introduction to pattern making- Pattern materials, pattern making, allowances, Types of patterns, General properties of moulding sands, Mold hardness. Preparation of sand moulds of different types, Moulding processes, core making.
- Sand casting Processes - Basic principle and Terminology of sand casting, gating system, types of gate, Risers design, Reserving aids, (analytical approach to riser design). (9 Hrs)

Unit-II:- Technology of melting and casting - Melting furnaces pit, open hearth, gas fired cupola and electric hearth furnaces, cupola operation development in cupola melting, Electric furnaces - Direct Arc, Indirect arc and electric induction furnace. Modernisation & Mechanisation of Foundries, Defects in castings.

* Origin and classification of defects, shaping faults, Inclusions and sand defects, Gas defects, shrinkage defects, contraction defects, dimensional errors. Inspection and testing of castings:- Radiography, ultrasonic, Eddy current testing, fluorescent penetrant test. (8 Hrs)

Unit III:- Casting processes and their principle of operation and applications permanent mold casting, slush casting, shell molding, Investment or lost wax casting, vacuum process, centrifugal casting, continuous casting, Die casting equipment and processes for Gravity, pressure and vacuum casting methods. (7 Hrs)

SECTION - B

Unit IV :- Hot and cold working of metals : Difference in hot working & cold working extrusion & types, piercing, pipe and tube production, manufacture of seamless pipe and tubing. Cold working processes. Shearing operations, tube drawing, wire drawing, spinning, embossing and coining, squeezing and sending operations, rotary swaging, Rolling, types of rolling forging operations, upset (m/c) forging, drop hammers. (8 Hrs)

Unit V:- Joining processes:-

Mechanical joining processes rivetting, soldering, brazing (introductory), Welding Requirements for welding, Types of welding processes-Arc welding: arc initiation, arc maintenance, and arc control, transfer of metal across the gap, Electrode efficiency, Types and purpose of Electrodes, I.S.F. for providing the shielding.

TIG & MIG processes - TIG-Electrode polarity, loss and electrode contamination, shielding gases, MIG-Spray transfer and dip transfer processes (6 hrs.)

Unit VI:- a) Submerged arc welding & resistance welding :- Heat generation in resistance spot welding, operational characteristics of resistance welding processes such as projection welding, butt welding, percussion welding.

b) Principle of operation of friction welding, forge welding, plasma arc, thermit welding. Welding defects, Testing and Inspection of welds, Ultrasonic, Electroslag, Electron Beam, laser welding, weldability.

c) Surface Treatment-Electroplating, electroforming, and iodising, metal spraying, shot peening, polishing, mechanical cleaning. (9 Hrs)

PRACTICE:-

1. Foundry :- Sand preparation and practice in moulding of various types of patterns. Moulding 2 jobs, pattern making 2 jobs.
2. Joining Processes:- 2 composite jobs involving electric welding, gas welding and cutting.

A journal should be prepared and submitted on above term work. The practical examination shall consist of a job preparation and college assessment should be based upon the jobs, termwork and viva examination.

References:-

1. Production Technology * R.K.Jain.
2. Principle of foundry Technology * P.L.Jain.
3. Workshop Technology I & II * Raghuvanshi.
4. Processes and Materials of Manufacture * R.A.Lindberg PHI Pub.
5. Foundry Technology by Goel Sinha.
6. Workshop Technology * Hajra Chaudhary.
7. Workshop Technology Vol. I & II * Bawa.

FOURTH SEMESTER

4 SMP 1

BASIC ELECTRICAL DRIVES & CONTROL

SECTION-A

Unit I : Concept of general electric drives, classification and comparison of electrical drive system, Cooling and heating of electric motors. Introduction to mechatronics, Theory and principle of Power Transistor, Power MOSFET, SCR and IGBT.

Unit II : Basic characteristics of D.C. motor, Torque equation, Modified speed - Torque characteristics. Starting and braking of Electrical D.C. motors, comparison of mechanical and electrical braking methods. Introduction, Principle, construction and working of P.C. servo motors, stepper motors, Brushless D.C. motors.

Unit III : Classification of A.C. motors, construction, types, principle of working and characteristics of 3 phase Induction motors, applications. Starting and braking of 3 phase induction motors. Classification of single phase induction motors. construction, principle and working and applications. Principle and working of universal motor, Linear Induction Motor.

SECTION-B

Unit IV : Conventional methods of speed control of A.C. and D.C. motors. Thyristorized stator voltage control of 3 phase induction motor, (v/f) control method, slip-power recovery scheme. Thyristorized armature voltage control of D.C. motors using phase control & Thyristorized chopper.

Unit V : Basic principle, construction & applications of sensors and transducers, contact - non - contact type, optical proximity sensors. Switches, contact type, magnet type, electromagnetic type, sound, light, pressure, vibration transducers, Hall effect - sensors A.C. / D.C. Tachogenerators.

Unit VI : Industrial applications - classes of duty selection of an electric drive for particular applications such as steel mill, paper mill, cement mill, textile mill, sugar mill, electric traction, coal mining, etc. Induction heating, surface harding & Dielectric heating.

REFERENCE BOOKS:

- 1) Introduction to Mechatronics and Measurements Systems by Michael B. Histan and David G. Aleiatove, McGraw Hill, 1993.
- 2) Mechatronics - W.Bolton, Addison Wesley, Longman Ltd., 1997.
- 3) Mechatronics - HM T Ltd., Tata McGraw Hill.
- 4) Mechatronics - Electronics in Production & Process - D.A. Dawson, N.C.Burd & A.J. Loader, Chapman Hall, 1993.
- 5) Mikell P. Groover and Emergy W. Zimmer, Jr.
- 6) Benjamin C. - Automatic Control Systems - Prentice Hall, New Delhi, 1992.
- 7) Introduction to Mechatronics and Measuring Systems - Michael B. Histant and David G. Aleialove, McGraw Hill, 1999.
- 8) Mechanical Measurements - Beckwith T., Marongoni R., Liseehard, 5th Edition, Addison Wesley, 1993
- 9) Doebelin E.O. - Measurement Systems, McGraw Hill, 1975.
- 10) A First Course on Electrical Drives - S.K. Pillai.
- 11) Basic Electrical Technology (Vol. 11) - B.L. Theraja.
- 12) Drives and Control - N. Dutta.

4SMP2

ENGINEERING METALLURGY

SECTION -A

Unit I :- Introduction to metallurgy: Basic concept of process metallurgy, physical metallurgy, and mechanical metallurgy.

Classification of materials & their application

Structure of metals and alloys, formation of Alloys,

Solid solutions, types and their formation lever rule for phase mixtures.

Solidification of pure metals, nucleation and growth, ingot structure, dendritic solidification

Introduction to processes for chemical analysis of metals: spectrometry, gravitometry. (07 Hrs)

Unit II : Study of binary equilibrium diagram and invariant reactions

Construction and study of Iron-carbon Equilibrium Diagram

Critical temperatures

Microstructure of slowly cooled steel

Estimation of carbon from microstructure, structure property relation.

Introduction to composite materials, advantage and applications. (08 Hrs.)

Unit III : **Alloy Steels:** Classification and application of plain carbon steel

Effect of grain size and impurities on properties of plain carbon steel

Purpose of alloying, classification of alloying elements and their effect on steels, effect on transformation in steel,

Low alloy engineering steels and High speed steels, their heat treatments and applications.

Ferritic, Austenitic and Martenstic stainless steels, their properties and applications, weld decay in stainless steel.

(08 Hrs.)

SECTION-B

Unit IV : **Cast irons :** Constitution and properties of white, gray, Nodular and Malleable cast irons, their applications, Alloy cast irons.

Non Ferrous Metals and Alloys : Types, Properties and uses

of Brasses and Bronzes. Important alloys of Aluminium, Lead, Tin and Zinc, their applications.

Bearing materials, Season cracking, precipitation hardening.
(07 Hrs)

Unit V : **Principles of Heat Treatment:** - Annealing, Normalizing, Tempering Iso-thermal transformation diagrams(S-curve), super imposition of continuous cooling curves on 's' Curve. Characteristics of pearlite, bainite and martensitic transformation during continuous cooling. Quenching media, severity of quench, Austempering, Martempering and patenting, Retained austenite and sub-zero treatment.

Hardenability, Methods of surface hardening: Carborizing, Nitriding, Cyaniding, Flame and Induction Hardening.

(10 Hrs)

Unit VI: **Mechanical working of Metals:** - Hot and cold working, Relative advantages and dis-advantages, study of stress-strain curve, Luders bands Work hardening, strain Ageing; Recovery, Recrystallisation and grain growth. Metallurgical factors affecting various working processes, preferred orientation, Deformation mechanisms-Slip, twinning, critical resolved shear stress.

Powder Metallurgy: Manufacture of metal powders, Atomization, Milling, Reduction, Electrolysis, carbonyl. Process; Single die and double die compaction, sintering, stages of sintering. Manufacture of porous bearings and cemented carbide tip tools by P.M. techniques. Advantages, limitations and applications of powder metallurgy.

(08 Hrs)

PRACTICALS :-

Eight of the practicals mentioned below shall be performed and report/Journal there of shall be submitted by voce on the above syllabus and practical work.

LIST OF PRACTICALS :-

1. Study of metallurgical microscope.
2. Preparation of specimen for micro-examination.
3. Moulding of specimen for micro-examination.
4. Study of micro structures of Annealed and normalised plain carbon-steels.
5. Study of micro structures of alloy steels and H.S.S.
6. Study of micro structures of various cast irons.

7. Study of micro structures of Brasses.
8. Study of micro structures of Bronzes.
9. Study of micro structures of White metal bearing alloys and alloys.
10. Study of micro structures of hardened and tempered steels.
11. To study F.e.(Equilibrium diagram & Allotropic forms of Fe.)
12. To study different Heat Treatment Process for steel.
13. To study different surface Hardening processes for steels.
14. To study effect of alloying elements on the properties of steels.
15. To measure variation in hardness by hardness tester (Jominy end quench test apparatus)
16. Study of hardness tester and conversion of Hardness number
17. Industrial visit to study heat treatment plant.

4SP3

THEORY OF MACHINES

SECTION - A

Unit I:- Mechanisms : Introduction to study of mechanism & machines, Basic definitions, Kinematic pair and chains; Inversions of Four bar, slider crank and double slider mechanism.

Common Mechanism : Straight line mechanism; Quick return Toggle mechanism; Steering mechanisms. (8 Hrs).

Unit II:- Velocity and Acceleration Analysis : Relative velocity and acceleration method; Instantaneous centre method; Analytical method for determination of velocity and acceleration in slider crank mechanism. (8 Hrs)

Unit III:- Cams :-

Types of Cams and followers ; Field of application; Graphical layout of radial cams. (6 Hrs)

Gears and Gear Trains : Terminology for all types of gears; law of involute gearing; Interference and methods to reduce it, Gear trains, Velocity ratio.

SECTION - B

UNIT IV :- Friction and Lubrication :-

Friction in pivot and collars : Brakes and clutches. (6 Hrs)

Balancing :- Static and dynamic unbalance; Balancing of several rotating masses in single and multi transverse planes.

(6 Hrs)

UNIT V :- Dynamic Force Analysis :- Inertia forces; D'Alembert's principle; Dynamic force analysis of slider crank mechanism;

Shaking forces, TQ diagram; Flywheel requirement.

UNIT VI:- Vibration Analysis :- Introduction to longitudinal, Transverse and torsional vibrations; free and forced vibrations with and without damping; critical speed. (8 Hrs)

PRACTICALS :-

Term work shall consist of ten experiments based on the following and evenly distributed on the syllabus.

1. Study of inversions of four bar mechanism.
2. Study of inversions of slider crank mechanism.
3. Study of inversions of double slider mechanism.
4. Velocity analysis of mechanisms.
5. Graphical layout of radial cam.
6. Acceleration analysis of mechanisms.
7. Determination of velocity ratio in gear trains.
8. Graphical layout of involute gear profile.
9. Study of various brakes..
10. Study of various clutches.
11. Static and dynamic balancing of rotating masses.
12. Determination of inertia force of connecting rod by graphical method.

REFERENCE BOOKS :-

1. Theory of Machines by Jagdish Lal.
2. Theory of Machines by T. Bevan.
3. Theory of Machines by P.L.Ballaney.
4. Theory of Machines by J.Singley.

4SMP4 MANUFACTURING PROCESS - II

SECTION - A

UNIT I :- Theory of Metal cutting: Mechanics of Metal cutting, Tool material, Tool Geometry, Tool life, Tool wear, Cutting forces and power consumption, Machinability, Metal cutting economy, Cutting fluid, Machine Tool classification. (6 Hrs)

UNIT II:- Construction, Operations and accessories of centre lathe, introduction of capstan & turret lathe, indexing mechanism, bar feeding mechanism, introduction to Automatic screw machines & Single spindle and multi-spindle automat.

(8 Hrs)

UNIT III:- A) Drilling M/cs general purpose, Mass production and special purpose drilling M/cs.

B) Processing of plastics by compression, Transfer, Injection, Extrusion. Blow-moulding, Rotational moulding and calendaring. (8 Hrs)

SECTION - B

UNIT IV:- A) Boring M/c :- Horizontal, Vertical and jig Boring M/c.

B) Milling M/c :- Types, Types of Milling Cutters, Dividing head, Compound and differential indexing.

C) Gear producing M/cs. (10 Hrs)

UNIT V :- A) Grinding Machines: Bench grinders, surface grinders, centreless grinders, types of bonds & Abrasive modification of grinding wheels.

B) Study of various part & Operation of Shaper, Planer, slotter and power hack saw. (8 Hrs)

UNIT VI:- Unconventional Machining Processes:-

a) Mechanical Processes:- Ultrasonic Machining - principle and applications. process parameters ; Abrasive and water abrasive jet machining :- Mechanism of metal removal parameters involved.

b) Thermal processes:- Electron Beam Machining - Generation of beam, principle and applications : Laser Beam machining applications : Plasma-arc machining- Concept and generation of plasma, principle of PAM, applications.

c) Electro Chemical Machining- Classification, fundamentals: Electro mechanical milling.

d) Electric discharge Machining - Types die-sinking, wire EDM, Mechanism of material removal, process parameters, advantages and applications. (8 Hrs)

PRACTICALS:-

Demonstration of operations related to lathe, shaper, slotter, drilling & grinding m/cs.

Machine shop practise.

One job on lathe covering taper turning and threading.

One job on shaping covering plane and inclined surfaces.

One job on milling machine.

The above jobs should include drilling, grinding, tapping etc.

Demonstration of plastic moulding machine. Term work should be submitted in the form of journal.

N.B. :- The practical examination shall consist of preparation of practical jobs and assessment by external and internal examiner.

REFERENCES:-

1. Workshop Technology - By Raghuvanshi. Vol 1 & 2.
2. Workshop Technology - By Hajra Choudhary Vol 1 & 2.
3. Plastic Technology - By W.J.Patton.

4SMP5

MACHINE DRAWING

SECTION - A

UNIT I : Sectional views:- Conversion of pictorial view into sectional orthographic projections, sectional views with different types of sections, missing views.

UNIT II : Intersection of surfaces:- Interpenetration of solids, prism and prism, cylinder and cylinder, cylinder and prism, cone and cylinder, cone and prism.

UNIT III : 1. Latest ISI conventions covering the standard practice in machine drawing. Conventions for various components like bearing, gears, springs, key and key ways, threads, tap holes and materials.
2. Symbolic representations for working drawing for welded joints.
3. Use of specifications for limits, fits and tolerances.
4. Conventions used for surface roughness i.e. machining symbols, M/c allowance symbols etc.

SECTION - B

UNIT IV Preparation of freehand proportionate sketches of various machine elements such as—
1. Rivets & Riveted joints.
2. Keys, Cotters and cotter joints, knuckle joints and couplings.
3. Bearing and bearing mountings.
4. Engine & machine tool components.

UNIT V Preparation of detail drawing of simple machine assemblies,

like pedestal bearing, plummer block, simple eccentric, stuffing box, cross head, connecting rod, tail stock, tool post, c-clamp, screw jack, boiler safety valve etc.

UNIT VI Preparation of assembly drawing of simple machine assemblies, like pedestal bearing, plummer block, simple eccentric, stuffing box, cross head, connecting rod, tail stock, tool post, c-clamp, screw jack, boiler safety valve etc.

TERM WORK:-

Sheet No. 1 :- Sectional views of some objects and missing views.

Sheet No. 2 :- Intersection of solids.

Sheet No.3 :- Various symbols of welded joints, their working drawings, specifications for limits, fits, surface roughness symbols etc. from Unit III.

Sheet No. 4 : Dimensioned sketches of various machine elements from Unit IV.

Sheet No. 5 :- Dimensioned sketches of different elements from assemblies.

Sheet No. 6 :- Detail of assembly drawing of different machine assemblies.

Introduction & exposure to basic computer drafting packages.

At least two computer outputs using packages like Auto CAD/ Solid edge/ Solid works etc. for the engineering applications such as.

1. Profile of standard machine parts such as hexagonal nut, bolts, rivets, bearing, circlips, bracket, spring, keys, pins etc.

2. Isometric drawing of simple m/c components.

PRACTICAL EXAMINATION:-

This shall consist of viva voce on above termwork and syllabus.

REFERENCES:-

1. Machine Drawing - N.D.Bhatt
2. Engineering Drawing - N.D.Bhatt
3. Machine Drawing - N.Sidheshwar, Shastry, Kanhaiah.
4. Machine Drawing - Narayanan.

APPENDIX-B
FOUR YEAR B.E. DEGREE COURSE
PRODUCTION ENGINEERING
SEMESTER PATTERN
SEMESTER : THIRD

L : Theory Lecture
T : Tutorial
P : Practical
D : Drawing / Design

ABBREVIATIONS :-
S - SEMESTER PATTERN

M - MECHANICAL
P - PRODUCTION

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme									
			L	T	P/D	Theory			Practical						
No.						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks College Assessment	Total	Minimum Pass Marks
1.	3SMP1	Applied Mathematics-III	4	1	-	5	3	80	20	100	40	—	—	—	—
2.	3SMP2	Mechanics of Material	3	1	2	6	3	80	20	100	40	—	25	25	12
3.	3SP3	Fluid Power & Systems	4	-	2	6	3	80	20	100	40	25	25	50	25
4.	3SP4	Thermal Power Engineering	3	0	2	5	3	80	20	100	40	—	25	25	12
5.	3SMP5	Manufacturing Process-I	4	-	4	8	3	80	20	100	40	25	25	50	25
TOTAL			18	2	10	30				500				150	

GRAND TOTAL : 650

FOURTH SEMESTER

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme									
			L	T	P/D	Theory			Practical						
No.						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks College Assessment	Total	Minimum Pass Marks
1.	4SMP1	Basic Electrical Drives & Control	3	1	2	6	3	80	20	100	40	25	25	50	25
2.	4SMP2	Engineering Metallurgy	4	-	2	6	3	80	20	100	40	25	25	50	25
3.	4SP3	Theory of Machines	3	1	2	6	3	80	20	100	40	25	25	50	25
4.	4SMP4	Manufacturing Process-II	4	-	2	6	3	80	20	100	40	25	25	50	25
5.	4SMP5	Machine Drawing	2	-	4	6	4	80	20	100	40	25	25	50	25
TOTAL			16	2	12	30				500				250	

GRAND TOTAL : 750

*** REGULATION NO. 1 OF 2003****Examinations leading to the Degree of Bachelor of Engineering (Production Engineering) (Four Year Degree Course.... Semester Pattern) Regulation, 2003.**

Whereas it is expedient to frame the Regulation in respect of Examinations leading to the Degree of Bachelor of Engineering (Production Engineering) (Four Year Degree Course.....Semester Pattern) for the purposes hereinafter appearing the Management Council is hereby pleased to make a following Regulation.

1. This regulation may be called “Examinations leading to the Degree of Bachelor of Engineering (Production Engineering) (Four Year Degree Course....Semester Pattern) Regulation, 2003.
2. This Regulation shall come into force w.e.f. the Academic session-
 - i) 2000-01 for Ist & IInd Semester B.E.,
 - ii) 2001-02 for IIIrd & IVth Semester B.E.,
 - iii) 2002-03 for Vth & VIth Semester B.E., and
 - iv) 2003-04 for VIIth & VIIIth Semester B.E.
3. The Schemes of Teachings and Examinations for Ist & IInd, IIIrd & IVth, Vth & VIth, and VIIth & VIIIth Semester in respect of Bachelor of Engineering (Production Engineering) (Four Year Degree Course.... Semester Pattern) shall be as per Appendices A, B, C, and D appended with this Regulation respectively.

*As amended by Regulation No. 22 of 2007 & 47 of 2007.

PART-A

SHORT ANSWER PATTERN

Total Marks : 100

25 Marks

1. The Multidisciplinary nature of environmental studies

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

2. Social Issues and the Environment

- . From Unsustainable to Sustainable development
- . Urban problems related to energy
- . Water conservation, rain water harvesting, watershed management
- . Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- . Environmental ethics : Issues and possible solutions.
- . Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- . Wasteland reclamation.
- . Consumerism and waste products.
- . Environment Protection Act.
- . Air (Prevention and Control of Pollution) Act.
- . Water (Prevention and Control of Pollution) Act.
- . Wildlife Protection Act.
- . Forest Conservation Act.
- . Issues involved in enforcement of environmental legislation.
- . Public awareness.

(7 lecture hours)

3. Human Population and the Environment

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies.

(6 lecture hours)

4. Natural resources :**Renewable and non-renewable resources :**

- . Natural resources and associated problems.
 - Forest resources : Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
 - Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
 - Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
 - Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
 - Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
 - Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- . Role of an individual in conservation of natural resources.

- . Equitable use of resources for sustainable lifestyles.

(8 lecture hours)

5. Ecosystems

- . Concept of an ecosystem.
- . Structure and function of an ecosystem.
- . Producers, consumers and decomposers.
- . Energy flow in the ecosystem.
- . Ecological succession.
- . Food chains, food webs and ecological pyramids.
- . Introduction, types, characteristic features, structure and function of the following ecosystem :-
 - Forest ecosystem
 - Grassland ecosystem
 - Desert ecosystem
 - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lecture hours)

6. Biodiversity and its conservation

- . Introduction - Definition : genetic, species and ecosystem diversity.
- . Biogeographical classification of India.
- . Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- . Biodiversity at global, National and local levels.
- . India as a mega-diversity nation.
- . Hot-spots of biodiversity.

- . Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- . Endangered and endemic species of India.
 - . Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lecture hours)

7. Environmental Pollution

- . Definition
 - . Causes, effects and control measures of :-
 - Air pollution
 - Water pollution
 - Soil pollution
 - Marine pollution
 - Noise pollution
 - Thermal pollution
 - Nuclear hazards
 - . Solid Waste Management : Causes, effects and control measures of
 - . Role of an individual in prevention of pollution.
 - . Pollution case studies.
 - . Diaster management : floods, earthquake, cyclone and landslides. (8 lecture hours)

PART-C ESSAY ON FIELD WORK 25 Marks

8. Field work

- . Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain
- . Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
- . Study of common plants, insects, birds.
- . Study of simple ecosystems - pond, river, hill slopes, etc. (5 lecture hours)

- (Notes :**
- i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
 - ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
 - iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

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- 21) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications (TB)
- 22) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.
- 23) डॉ. विठ्ठल घारपुरे : पर्यावरणशास्त्र- पिंपळापूरे अॅन्ड कंपनी पब्लीशर्स, नागपूर.(R)
- 24) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.: Environmental Studies, Pimpalpure & Co., Publishers, Nagpur.(R)

(M) Magazine

(R) Reference

(TB) Textbook

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
* **ORDINANCE NO. 42 OF 2005**

Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called "Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005."
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
 - (i) "Academic session" means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
 - (ii) "Admission to an examination" means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
 - (iii) "Applicant" means a person who has submitted an application to the University in the form prescribed for admission to an examination.
 - (iv) "Candidate" means a person who has been admitted to an examination by the University.
 - (v) "Regular Candidate" means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuted a regular course of study.
 - (vi) "Examinee" means a person who presents himself/herself for an examination to which he/she has been admitted.
 - (vii) "Examination" means an examination prescribed by the University under the relevant Ordinance.
 - (viii) "External Candidate" means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.

* As amended vide Ord. Nos. 7/2006 and 10/2007.

- (ix) "Non-Collegiate Candidate" means a candidate who is not a collegiate candidate.
 - (x) An "Ex-student" is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
 - (xi) "Bachelor Degree Examination" means an examination leading to Bachelor Degree of the University.
 - (xii) "Previous Year" means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
 5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
 - 1) Bachelor of Arts
 - 2) Bachelor of Performing Arts
 - 3) Bachelor of Fine Arts
 - 4) Bachelor of Mass Communication
 - 5) Bachelor of Social Work
 - 6) Bachelor of Commerce
 - 7) Bachelor of Business Administration
 - 8) Bachelor of Science
 - 9) Bachelor of Computer Science
 - 10) Bachelor of Computer Applications
 - 11) Bachelor of Pharmacy
 - 12) Bachelor of Science (Home Science)
 - 13) Bachelor of Technology (Cosmetics)
 - 14) Bachelor of Engineering
 - 15) Bachelor of Engineering (Part Time) (Civil)
 - 16) Bachelor of Textile
 - 17) Bachelor of Technology (Chemical Technology)
 - 18) Bachelor of Technology (Chemical Engg.)
 - 19) Bachelor of Architecture, and
 - 20) Bachelor of Laws (Five Year Course)
 6. i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,

- 1) Bachelor of Arts
 - 2) Bachelor of Performing Arts
 - 3) Bachelor of Fine Arts
 - 4) Bachelor of Mass Communication
 - 5) Bachelor of Social Work
 - 6) Bachelor of Commerce
 - 7) Bachelor of Business Administration
 - 8) Bachelor of Science
 - 9) Bachelor of Computer Science
 - 10) Bachelor of Computer Applications
 - 11) Bachelor of Pharmacy
 - 12) Bachelor of Science (Home Science)
 - 13) Bachelor of Technology (Cosmetics)
 - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
 - 2) Bachelor of Textile
 - 3) Bachelor of Technology (Chemical Technology)
 - 4) Bachelor of Technology (Chemical Engineering)
 - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.
Explanation:- Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of

- the subject.
10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University. Provided that prescribed evaluation fee for evaluation of each answer book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.
11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.
13. i) Duration of theory examination of this subject shall be three hour.
ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.
iii) Distribution of these 100 marks shall be as follows :-
- | | | |
|---|---|----------|
| a) Part-A, Short Answer Pattern | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work | - | 25 Marks |
14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.
15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.

16. For teaching of the subject, there shall be atleast two hour per week.
For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered elligible.
17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.
18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies.
Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.
20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.
21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.

Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.
