DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

B.E. [Production Engineering]

[Effective from 2009-10 & onwards]

Dr. Babasaheb Ambedkar Marathwada University Aurangabad
Proposed (Revised) Teaching /Examination Scheme of B.E.(productionl)
[w.e.f.2009-2010]

Sr. No	Course Title	Weekly Load (hours)			Examination Scheme				
		L*	P*	Tot	Theory	Term Work	Practical	Total	Duration of Th. Exam.
	Part-I								
1	Theory of Metal Forming	04	02	06	100	25	25		3hrs
2	Production Planning and Control	04	02	06	100	25	25		3hrs
3	Machine tool technology	04	02	06	100	25	----		3hrs
4	Robotics &Industrial applications.	04	02	06	100	50			3hrs
5	Elective-I	04	---	04	100	-----	----		3hrs
6	Seminar	---	02	02	----	25	-----		
7	Project -1		02				50		
	Total of part-I	20	12	36	500	150	100	750	
	Part-II								
1	Automatic Control System	04	02	06	100	25	25		3hrs
2	Operation Research	04	02	06	100	50	----		3hrs
3	Industrial Engineering	04	02	06	100	25	25		3hrs
4	Elective - II	04	02	06	100	50	----		3hrs
5	Project II	---	04	04	-----	50	100		
	Total of part-II	16	12	28	400	200	150	750	
	Total of part-I&II	36	24	64	900	350	250	1500	

Elective I:
1) Mechatronics – II
2) Manufacturing Systems
3) Advanced Materials & Manufacturing Techniques
4) Computer Aided Engineering.

Elective II:
1) Simulation & Mathematical Modeling
2) Costing And Financial Management
3) Design of Experiments
4) Non-Conventional Machining Process

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Final Year (Production Engineering) Revised
FIRST SEMESTER (PART I)

THEORY OF METAL FORMING

(One Theory Paper: 100 marks, 3 hrs, Term work: 25 marks, Practical Exam: 25 marks)

1. Theory of Metal Forming: Plasticity, Stress-strain curves, true strain, maximum shear stress theory, distortion energy theory, yield criteria, stress and strain in variants, Methods of analysis of bulk forming processes like slip-line, upper bound and lower bound approach. (6 hrs)

2. Fundamentals of Plastic Working of Metals:- Classification of forming processes, effect of temperature and strain rate on forming processes. Structural changes during the process. (3 hrs)

3. Sheet Metal Working: Shear on press tools movement of metal in bending and forming operation, classic spring back Movement of meta! and stresses in drawing, Red drawing limits wall thinning and thickening and ironing theory, defects in deep drawing, deep drawn parts, applications of tensile, cupping wedge and simulative tests. Drawing load calculation. Reverse drawing. (5 hrs)

4. Forging: Application of plastic theory of metal flow under impact pressure, press forging, Designing forged parts, selection of forging metals and heat treating practice, Die design for drop hammer, presses and upset machines. Effect of friction, load calculations, Die block materials and heat treatments, forging plant equipment, Finishing - operations and inspection of forgings, Recent developments in forging: ." (6hrs)

5 Extrusion: Classification of extrusion processes, equipment:; and dies used in extrusion, Application, plasticity theory to extrusion problem, variables in extrusion, Deformation in extrusion. The influences of speed and temperature upon extrusion pressure, extrusion defects and remedies for minimizing them, metals and alloys available for extrusion, production of seamless pipe and tubing, Hydrostatic extrusion. (6 hrs)

6. Rolling: Types of rolling mills for hot and cold, rolling, forces and geometrical relationship in rolling, Deformation in rolling, Residual stress in rolled products, Theories of cold
rolling and hot rolling their applications, calculation of mill-torque, mill horsepower and rolling load, defects in rolled products, roll pass design considerations(6 hrs)

7 Rod Wire and Tube Drawing: Principles involved in the drawing of rod and wire, variables in wire drawing, wire drawing with and without friction, wire drawing machines, Applications of theory of plasticity to drawing. The drawing processes with a stationary and moving materials. Residual stresses in rod wire and tubes, defects in wires and tubes. (5 hrs)

8. Friction and Lubrication in Metal Working: Influence of friction, measurement of coefficient of friction, principles of lubrication, lubricants used in industrial metal working. (3 hrs)

Term Work

It shall consists of the record of at least eight assignments on the above syllabus and demonstration of any two forming processes.

Practical Examination

Practical examination shall consist viva voce based on the syllabus.

Recommended Books

I) Principles of industrial Metal Working Processes. - G.W. Rowe (Arnold)
2) Engineering Plasticity :- Johnson and Mellor (Reinhold)
3) Metal forming Process & Analysis :- B- Avitzue (Tata McGraw Hill)
4) Principles of Metal Working: S. Kumar (PHI)
5) Manufacturing Science - by Ghosh & Malik
6) Introduction to the Theory of Plasticity for Engineers: Hoffman and Sachs (McGraw Hill)
7) Metal Rolling: R.C. Chaturvedi.
8) Stresses and Strains in Rolling: T selikoy
9) Mechanical Metallurgy: G.E. Dieter, McGraw Hill

PRODUCTION PLANNING AND CONTROL

(One Theory Paper: 3 hrs., 100 Marks, Term Work:25 marks,Practical Exam. : 25 marks)

1 Introduction:
Definition of PPC, functions of PPC, Types of production job. Batch. Continuous, production cycle (2 hrs)

2 Product Development and Design:
Effect of competition, product analysis, marketing aspects, product characteristics, economic analysis, simplification, standardization. specialization, Break even analysis. (3 hrs.)

3 Forecasting :
Importance, time - series analysis, forecasting methods, time series calculation, least squares, simple and moving average, seasonal index, exponential smoothing. co-relation. Co-efficient of co-relation, and determination. Delphi method. Normal group techniques, selection of forecasting methods. (5 hrs.)

4. Plant Layout :
Flow system, types of layout: product, process, static product and combination layout, effect of automation on layout, symptoms of bad plant layout. (4 hrs)

5 Evaluation of Materials and Processes:
Criteria for rnaterial selection, material utilization of product, selection of process, Design for production. (3 hrs.)

6 Production Order.
Formulation of production order, Process charts, activity charts, operation and route sheet. (2 hrs.)

7 Quantities in Batch Production :
Stock control, definition of batch size, minimum cost batch size, production range, maximum profit batch size. (3 hrs.)

.8 Machine Capacity:
.Machine output, Multi machine supervision by one operator, balancing multi product system. (3 hrs.)

9 Scheduling:
Basic scheduling problems:- Scheduling for fluctuating demand, assignment problems, sequencing problems, scheduling for orders with random arrivals, master schedule. (4 hrs)

10 Elements of Control Procedure :
Stages in control process, Dispatching, Expediting, Evaluating, Recording process: Control tools and techniques like Gantt Charts. (3 hrs)

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11 Materials Management : Definition, objectives, procurement orders, inventory management : Definition of inventory, need, types of inventory models, EOQ, Quantity discounts, ABC analysis, classification and coding of materials, stock. (4 hrs)

12 Computer aided PPC: MRP –1, use of computers in scheduling (2 hrs)

13 Capacity Planning:
Introduction, measurement of capacity, measures of capacity, capacity planning, estimating future capacity needs, factors influencing effective capacity, factors favoring over capacity & under capacity, aggregate planning, master production scheduling. (3 hrs)

Term work:
1) It shall consist of at least eight assignment based on the above syllabus
2) Critical analysis of plant lay out of the industry in which student has undergone in plant training
Practical Examination:
Practical examination shall consist of a Viva. Voce based on the above syllabus.

Recommended Books:
1 Elements of Production Planning and Control - Samuel Eilon
2 Production Systems, Planning analysis and control - James L. Riggs
3 Production Planning control and industrial Management - Jain and Agrawal.
4 Modem Production/Operations Managemcnt - Buffa.
5 Industrial Engineering and Managemem - O. P. Khanna.

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Machine Tool Technology
(One Theory Paper: 3 hrs, 100 marks, Term-work: 25 marks)

1. Introduction:
Trend in designing machine tools. Classification of various machine tools. General purpose, Special purpose, NC-CNC on the basis of kinematics, force & power required for various metal cutting operations & machine tools used. (3 hrs)

2. Drives:
Consideration in designing drives, based on continuous or intermittent requirement of power. Type and selection of motor for the drive, Regulation and range of speed based on preferred number / series / geometric progression. Design of head stock gear box for spindle drive using ray diagram, structure diagram, nodal optimization while designing compact gearbox, Harmonic drive, Recirculating Ball Screw. - - - (12 hrs)

3. Step less Regulation:
Electromechanical System of regulation, friction, pressure and ball variators, P.I. V. drive (Kopp.Variator) Epicyclic drive etc. (3 hrs)

4. Element of Machine Tools:
Design of beds, slide ways, carriage, tables of lathes, milling machines based on force, Frictional behaviour and - different types of lubrication system. Design of Power Screws - sliding as well as rolling friction, spindle units, supports for spindles, bearings, Preloaded supports, Rigidity and vibration analysis including stick slip sliding.(8 hrs)

5. Control System:
Electrical Control: Push button control, directional control relays, thermal relays, electrical brakes: automation in feed mechanism. Hydraulic Control in machine tool, positional movement. Power pack for lubrication system in hydrostatic drive. Control systems for Gear sliding and feed mechanism (open loop or closed loop) for NC/CNC machine using stepper motor or DC motor.(5 hrs)

6. Flexible Manufacturing System:
Definition, Types - Classification, equipment, application - Auto Tool Changer - types, functional details, Machine tool - features and constructional details. (3 hrs)

7. Static and Dynamic testing of Machines as per Schlesinger's test and Tobias stability envelopes,Performance criteria of Machine Tools. (3 hrs)

8. Recent Trends:
A review of recent practices used in Machine Tool Technology effect of development in manufacturing process, modular design concepts. (2 hrs)

Term Work
The term work shall consist of record of assignments on following topics.
Design & Working drawing of speed gear and feed gear box.

Design & Working drawing of four machine tool mechanisms.
Design of bed or column.
Design of sideways or power screws.
Preparation of standard test chart for General Purpose Machine (Anyone)

Recommended Books: "

1. Mehta, N.K. : Machine Tool Design, Tata McGraw Hill.
2. Pal D.K. and Basu, S.K.: Design of Machine Tools (4th Revised Ed) Oxford-IBH.
3. Acherkan, N.S. et al: Machine Tools Vol. I to Vol. IV, MIR Publications.
4. Bhattacharya, A. and Sen, G.C.: Principles of Machine Tools, New Central Book Agency,
Calcutta.
5. T. Kundra, Rao, P.M. Tiwari, N.K.: Numerical Control and Computer Aided Manufacturing, Tata
McGraw Hill.
6. Martin, S.J : NC Machine Tools, ELBS.

ROBOTICS AND INDUSTRIAL APPLICATIONS

(Teaching Scheme: 4Hours/week , Examination Paper: 100 Marks, Termwork:50 marks)

Theory Paper: 3Hours

1. Introduction

Definition & History of robots, Automation and Robotics, Robot-Anatomy, Robot classification – Drive technologies, Work –Envelope Geometries, Motion control methods, Robot specifications – Payload, Reach, Precision, Accuracy and Repeatability.**6**

2. Robot Kinematics

Matrix representations of coordinate transformation, Transformation about reference frame and moving frame, Forward & Inverse Kinematics. Examples of 2R, 3R & 3P manipulators, RPY and Euler's angle. Homogeneous coordinate transformation and examples, D-H representation of kinematics linkages. Forward and Inverse kinematics of various manipulators using D-H representations.**10**

3. Trajectory Planning

Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, path generation in runtime, planning path using dynamic model, Joint space verses Cartesian Space, point to point and continuous trajectory , 4-3-4 & trapezoidal velocity strategy for robots.**8**

4. Robot End effectors, sensors and vision systems

End Effectors:– Types of end effectors, mechanical, vacuum, magnetic, adhesive grippers, tools as end effectors, Gripper force analysis and design.

Introduction to Sensors: - Need of sensors in a robotic system, Robotic sensors – Types of sensors based on working principle, desirable features of sensors, various sensing devices used in robot work cells, sensor characteristics, selection of sensors, photo-sensors, limit switches. Range sensors, proximity sensors, touch / sensors, Remote Center Compliance (RCC) device.

Vision Systems: - Need of vision in a robotic system, Image acquisition, Illumination Techniques, Image conversion, Cameras, sensors, Camera and system interface, Frame buffers and Grabbers.**6**

5) Robot Programming languages

Introduction, robot programming methods, robot programming languages, Artificial intelligence in robotics.**4**

6) Industrial applications – General considerations in Robot applications, Material transfer, Machine loading, Welding, Spray painting, Assembly, Inspection.**6**

Term Work

1. One Assignment on "Introduction to Robot Configuration"
2.. A demonstration of Robot with 2 DoF, 3 DoF, 4 DoF, etc.
3 Two Assignments on Programming the Robot for Applications
4. Two Assignments on Programming the Robot for Applications in Val II
5. Two Programming exercises for robots.
6. Two case studies of applications in industry involving working out the scheme with type of robots, other accessories with sequence and logic.
7. Exercise on robotic simulation software.

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References.

1) S.R.Deb, " Robotics Technology and Flexible Automation ", Tata McGraw Hill
2) M.P.Groover, M. Weiss R.N. " Industrial Robotics McGraw, Hill 1996
3) K.S.Fu, R.C.Gonzalez and C.S.G.Lee, " Robotics : Control , sensors , vision and intelligence ", MCGraw-Hill.1987.
4) J.J.Craig , Introduction to Robotics , Pearson Publications
5) Klafter , Richard D., et al " Robotics Engineering",PHI,1996.
6) Robert J. Schilling, "Fundamentals of Robotics Analysis and control", Eastern Economy Edition.
7) R K Mittal and I J Nagrath "Robotics and Control T M Hill
8) Saeed B Niku , "Introduction to Robotics, Analysis, Systems, Applications , PHI.

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Mechatronics - II
(One Theory Paper: 3 hrs, 100 marks)

1. Analog Signal Processing using op-amp : Introduction, Block-diagram of opamp IC ideal
model of opamp. Study of opamp parameters. Application of opamp : inverting amplifier non-inverting amplifier, summing amp, scaling & avg. amp. Voltage follower. Voltage to current & current to voltage converter. Integrator, differentiator, instrumentation amplifier, sample & Hold circuit. (6 hrs)

2. Active filters : Transfer function, Buffer worth filter, low pass filter, high pass filter, band pass filter & band stop filter. (3 hrs)

3. Digital Circuits: Number system, Binary number system. Gates - Or, AND, NOR, XOR NAND, NOT, Flip-Flops – SR, JK & D-type fI (3 hrs)

4. Microprocessor 8085 : Architecture, addressing. modes. instruction, set. Assembly language. programming. simple Arithmetic programs, counters, delays, stock & subroutine. Concept of memory & I/O interfacing, Interfacing of 8255 PPI, its initialization & programming.interfacing of LEDS, Keys, Seven-segment LEDS, opto isolators, electromechanical,relays, A to D and D to A conversion interfacing of ADC 0808 & DAC 08. (10 hrs)

5. Micro Controllers, programming & interfacing - introduction of 8051 family. Architecture of 8051, instruction set, programming, system, overview, I/O memory mapped. I/O interfacing, stepper motor, interfacing. (12 hrs)

6. Micro controller based mechanical systems - Boiler temperature, Controller- Speed Controller - Pressure Controller - Case studies: Coin counter - Robotic walking M/c. (6hrs)

Recommended Books
1) Linear Integrated circuits & Op2.1I1p - R.G. Gaigwad.
2) Modem Digital Electronics - R..P. Jain.
3) Microprocessor Architecture Programming & Application - Ramesh Gaonker
4) The 8085 Micro controller Architecture, Programming And Application."
- Kenneth Ayala
5) Introduction to Mechatronics &, Measurement system - David G. Alciatore, Michael B. Histand, Tata McGraw Hill.

Manufacturing Systems
(One Theory Paper: 3 hrs, 100 marks)

I. Introduction & Fundamentals of Manufacturing System: fundamental of Manufacturing, input / output of manufacturing, manufacturing system definition, system design, mold building, structural, transformational and procedural aspects of manufacturing system, integrated manufacturing system (IMS), integrated Manufacturing and Management System (IMMS), basic structure, framework of IMMS, production, types of production, types of manufacturing systems. (8 hrs)

2. High-volume Manufacturing System: Transfer line, Detroit type automation, design and fabric consideration, Analysis of automated flow lines: Technology, analysis of transfer line without shortage, practical automation, automated flow lines with storage buffers, computer simulation of automated flow lines. (8 hrs)

3. Computer Integrated Manufacturing: Introduction, Need, Computer application in manufacturing, automation and robotics, , computer integral production inventory systems. (4 hrs)

4.Group Technology: Introduction, review of part families part classification and coding, production flow analysis machine cell design. (4 hrs)

5. Cellular Manufacturing system: !introduction, need, cell formation, multi skill operator, man - machine, chart, inter and intra sell movement of material, maintenance of equipment. Flexible Manufacturing System: Introduction, concept, components of FMS, FMS planning, automated workplace handling, layout, cost feasibility, typical application, advanced areas: automated factory remote control. (8 hrs)

6. Manufacturing System: Lean manufacturing system, Toyota production system, 6 sigma Introduction its culture, implementation process, direct on line system, concept of zero inventory. (8 hrs)

Recommended Books
1 Manufacturing System Engineering by Rastasndo Hitom, Viva Books Pvt. Ltd.
2. CIM by Harrington, 1. Krieger.
3. Computer Integrated Design and Manufacturing by David Bedworth, McGraw Hill.
4. - C.c. Naw
5 Automation. Production Systems and CIM by M.P. Grooves Pearson Education. NewDelhi.
6. Toyato Production Systems by Taguchi Ohno, Productivity Press
7. Combining six sigma Quality with Lean speed by Michael L. George, TMH

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Advanced Materials & Manufacturing Techniques

(One Paper: 3 hrs, 100 marks)

A) Advanced Materials

1. Ferrous Materials: Mechanical properties, chemical composition, microstructures, heat treatment and applications, stainless steel and heat resisting steels, precipitation harden able steels, valve steels, high strength low alloy steel (HSLA), micro alloyed steels, ball bearing steel, tool steels; high nitrogen steels, alloy cast iron. (4hrs)

2. Nonferrous Materials: Mechanical properties, chemical composition, microstructures, heat treatment and applications, copper alloys (Brasses and Bronzes), Al-alloys (Al-MgSi, Al-Cu, Al-Si), designation system in Al-alloys, nickel and its alloys, lead and its alloys, tin and its alloys, titanium and its alloys, and zinc and its alloys. (4 hrs)

3. Composites: Classifications, properties, application of composites, polymer matrix materials, metal matrix materials, ceramic matrix materials, carbon materials, glass materials, fiber reinforcements, types of fibers, whiskers, laminar composite, filled composites, particulate reinforced composites, design of composites material hybrid composites, angle plied composites, mechanism of composites. calculation of properties, unidirectional fiber composites, critical volume & action, discontinuous fiber composites, rule of mixtures equation, critical angle (8 hrs)

4. Organic Materials: Classification, properties, applications of polymers, plastics and elastomers. (2hrs)

5. Ceramics: Classifications, properties, structures of refractories, abrasive materials, electronic ceramics, cement and concrete. (2 hrs)

6. Miscellaneous Materials: Classification, applications and properties of cutting tool materials, semi conducting materials, dielectric materials, magnetic materials, ferroelectric materials. (2 hrs)

7) Advanced Manufacturing Techniques : Advances In Casting Processes : Sheet moulding casting V Process, flask less moulding, evaporative casting, plaster mould casting design for plaster mould casting quality, accuracy uniformity & other considerations in casting and moulding. (5 hrs)

8. Chipless Metal Removal Process: Magneto abrasive finishing, Abrasive flow machining, Wire EDM, Water jet machining, Micro drilling by different processes like laser beam, ion beam, electro Jet, etc, electro stream drilling. Non traditional Deburring processes.(6 hrs)

9. Metallic Coating: Importance, principle, applications of: Chemical vapor deposition, physical vapor deposition, thermal spray coating, Electro plating, Electro less coating. (3 hrs)

10Rapid Prototyping (RP) . Principle and elements of RP. Advantages and applications of

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RP, Introduction to regenerative manufacturing processes like SLS, LOM, FDM (4hrs)

Term Work
Term work shall consist of the record of at least eight assignments based on the above syllabus.

Recommended Books

1. The Nature and Properties of Engineering Materials by Z-D. Jastrezebski.
2. Introduction to Physical Metallurgy by S.H. Avner.
3. Composites Materials by S.C. Sharma.
4. Materials and Processes in Manufacturing by E.P. DeGarmo, J.T. Black, R.A. Kosher.
5. Materials Science and Engineering by R.K. Rajput.
6. Composites Materials by Iele Chawla.
7. The Metals Data Book by Alok Nayar.
8. Polymer Science and Technology by Joel R. Fried.
9. ASM Handbook - Vol 10
10. ASM Handbook - Vol.2 Properties and Selection: Nonferrous alloys and special purpose materials.
11. Modern Manufacturing process Engineering by - Benjamin W. Niebel, Allen B. Draper, Richard A Wysk. - McGraw Hill
12. Non Traditional Manufacturing processes. By - Gany F. Benedict Marcel
13. Production Technology Hand Hook.- H.M.T. Tata McGraw Hill.
14. Metal Casting by - HaY&I1e and Rosenthal.
15. Non Traditional Machining Processes. By - E.J. Weller Society of Manufacturing Engineers, Dearban Michigan.
16. Manufacturing Processes: B.II. Amsted. Philip F. Oswald and Myron L. . Begeman, John Wiley Sc Sons, eighth edition.
17. ASM "Metals Hand Book", ASM Publications.
18. Non-conventional Machining Processes- P.K. Mishra, Narosa Publication.

Computer Aided Engineering
(One Theory Paper: 3 hrs, 100 marks)

1) Introduction:- Need, Applications, Advantages and disadvantages of CAE. (01 hrs)

2) Finite Element Modeling (FEM) :
Introduction, steps in Finite Element Analysis, Finite element formulation, variational methods, (Raleigh - Ritz method), weighted residual method (Gelerkin method) . (06 hrs)

3) FEM: One Dimensional Modeling : Element division, numbering scheme. co-ordinate and shape function, Displa.cement, strain and stress relational ship, element stiffness matrix by potential energy approach. Penalty Approach, Thermal effects in one dimensional Elements,. Analysis of trusses, Thermal effect in trusses, Boundary conditions.. (08 hrs)

4) FEM - Two dimensional modeling : Constant strain Triangular element - Stiffness matrix, const Triangular element - shape function application to heat transfer, fluid mechanics, plane elasticity. . (08 hrs)

5) Trusses: Introduction, plane truss, real and Global co-ordinate systems, calculation of l and m, element stiffness matrix, stress calculation. Temp. effects. (05 hrs)

6) Dynamic considerations : Introduction, formulation - solid body with distributed mass, element mass matrices, evaluation of eigen values and eigen vectors, properties of eigen vectors, eigen value, eigen vector evaluation, generalized Jacobin method, Tri diagonalization. . (06 hrs)

7) Preprocessing and Post-processing: Introduction, mesh generation, determed configuration and mode shape, contour plotting. Nodal values from known constant element. values for a triangle, least squares fit for a four nodal quadrilateral (04 hrs)

8) Collaborative engineering : Introduction & need, Web based design, extended enterprises, enterprise wide product visualization. (02 hrs)

Recommended Books
1) The Finite Element Methods in Engg. - by S.S. Rao
2) The Finite Element Methods in Engg - Reddy, Tata McGraw Hill.
3) The finite Element method - 3td Edition - O.c. Zienkiewicz. Tata McGraw Hill.
4) Concept and Application at finite Element Analysis - R.D. Cook, John Wiley publication
5) CAD/CAM and Autornation by Farazdak Maiden, Nirali Prakashan, Pune.
6) CAD/CAM –By . Radhakrishnan, S. Subrarnaniam,

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SEMINAR

(Term work 25 marks)

Seminar:

Every student either individually or jointly with other students shall work on a topic selected/assigned from any Engineering /allied fields for the seminar of academic and or/industrial interest. He/she should deliver a seminar talk based on the work done by him. His guide will judge his performance and another teacher appointed by the Principal. He/she should submit a seminar report as per the instructions and the format given below:

Instructions:

1. Seminar Report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 or 2.0 using black ribbon or carbon on one side of the Paper .
3. Margins:- (i) Left 37.5 mm.
(ii) Right, top and bottom 25 mm.
4. Binding:- Hard with golden embossing on the front cover of blue colour or soft comb binding with transparent front cover and non transparent plastic blue /black cover.
5. Front cover in case of hard bound report:
It should be identical to first title page.
6. Format for title page (First Page)
Seminar Report
On
Title of Seminar
by
Name of student
Submitted in partial fulfillment of the requirements for the degree of Bachelor of Engineering (Production)
Department of Production Engineering
Name of the college
7. Format for Certification page (i.e. Second page)

CERTIFICA TE

This is to certify that the Seminar report entitled
"Title of Seminar" Submitted by
Name of Student is completed as per the requirements of the Dr. Babasaheb Ambedkar Marathwada University in partial fulfillment of degree of B.E.(Production) for the Academic Year----------

Guide Head of Department Principal

8. The third page would be for acknowledgements which would be followed by index page
9. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
10. The last item on the index should be references.
    1. Format of seminar report

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a. First page (Title page) and cover of seminar report.

(Institute logo)

Seminar Report

on

"Title of Seminar"

By

Name of student

Submitted in partial fulfillment of the requirement for the degree of Bachelor of Engineering (Production)

Department of Production Engineering

Name of Institute

Year 2009-10

b. Certificate

(Institute logo)

CERTIFICATE

This is to certify that the seminar report entitled

"Title of Seminar"

Submitted by

Name of student

has completed as per the requirement of Dr. Babasaheb Ambedkar Marathwada University in partial fulfillment of degree

B.E.(Production)

Guide	Head of Department	Principal
(Name)	(Name)	(Name)

Department of Production Engineering

Name of Institute

Year 2009-10

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c. Acknowledgement:- Acknowledgement shall consists of students opinion related to the seminar topic and his gratitude towards his guide, other staff, social members and his friends those who have really helped him to complete seminar report.

d. Chapter Index: - Shall have title as "INDEX" in bold - 14 point aligned at top center and page consisting of table with three columns as Chapter No., Chapter particulars, and Page No.

Chapter No. and Page No shall be aligned at center of cell and chapter particulars left aligned in the cell.

e. Graph Index / Figure Index / Table Index: - Shall have title as "GRAPH INDEX / FIGURE INDEX / TABLE INDEX" in bold – 14 point center aligned at top of page. Page consisting of three column table as Graph No. / Figure No. / Table No. in first column, Title of Graph / Figure / Table in second column and Page No. in third column. (Similar to chapter index.)

2. Sketches:-Shall be drawn on separate sheet, center aligned with Figure No. and Title of sketch at its bottom.
3. Table shall preferably be typed in text format only with table no. and its title at the top, centrally aligned.
4. Standard mathematical symbols and notations shall be used.
5. The last item on Index should be references.
6. Compact Disc (C.D.) consisting of soft copy of seminar report, PPT, and supporting literature shall be affixed at back cover of report.
7. Presentation shall be made with help of Power point.
   a. Preferably each slide shall have plain white or faint yellow or navy blue or maroon colored back ground with contrast matching font.
   b. Each slide shall be numbered and header - footer shall be added similar to report.
   c. Figure / Graph / Table shall be labeled with Figure No. / Graph No. / Table No. and with reference nos. shown in seminar report
   d. Only brief points are to be highlighted on slides
   e. Information copied from references shall be numbered with reference number.

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f. Points are not to be read directly from slide at the time of presentation.
g. Presentation shall be based on Figure, Graph, Table, Charts and points etc.
h. First slide shall be identical to cover page of report.
i. Second slide should contain introduction / abstract of seminar and content of presentation with bullets.
j. Third slide shall focus on literature review.
k. Fourth slide on wards core content of presentation shall be discussed.
l. Slides at the end shall consist of merits, demerits, future scope, conclusion and references.

The Term work marks for seminar will be allotted based on the following

1. Seminar Report	10 Marks	
2. Literature Review	08 Marks	
3. Technical Content	10 Marks	
4. Presentation Skill (Aids used)	14 Marks	
5. Question Answer	08 Marks	Total 50 Marks

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PROJECT – I
(Practical Examination: 50 Marks.)

1. Every student or group of maximum three students should undertake a project work under the guidance of teacher allotted.
2. The project work could be theoretical work on trouble shooting, design development, fabrication of prototype / model, implementing a research paper or application of advanced software.
3. Preferably project shall be useful to the general community such as rural, former community and small scale industry etc.
4. If the project is based on software, it shall impart sufficient knowledge of software and its application to the students. The software used should not be among the softwares recommended in undergraduate curriculum. It should be entirely new to the students.
5. If the project is based on fabrication, it shall be supported by design and development.
6. It is essential that the student/s should concentrate on need, feasibility, economy, usefulness, effects on environment and global warming.
7. The student/s should get their project topic approved by the project committee under the leadership of project in charge / HOD appointed by Principal.
8. Student has to collect information from hand book, research journals, reference books, proceeding of conference through library or internet.
9. Student/s should prepare a spiral bound report with detail schedule of activities planned for completion of project and its presentation similar to the seminar report and shall be presented by all the partners dividing presentation among them at the time of examination in presence of guide and external examiner.
10. It is compulsory to continue with same project in next semester and copy of report shall be produced at the time of final dissertation. Theme of project defined in 7 th semester and its achievement must be compared.
11. Students shall prepare paper / project to participate in State level / National / International competition. The projects participated shall get additional benefit in final semester based on certificate of participation.

The practical examination shall be based on presentation and marks shall be allotted on following points.

1. Report	5 Marks.	
2. Literature Review	5 Marks.	
3. Technical Content	5 Marks.	
4. Regency of topic	5 Marks.	
5. Usefulness	5 Marks.	
6. Feasibility	5 Marks.	
7. Presentation	5 Marks.	
8. Economy	5 Marks.	
9. Merits	5 Marks.	
10 Question / Answer	5 Marks.	**Total 50 Marks**

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Final Year (Production Engineering) Revised
SECOND SEMESTER (PART II)

AUTOMATIC CONTROL SYSTEMS

(One Theory Paper: 3 hrs. 100 marks. Term Work: 25marks. Practical Exam: 25 marks)

1. Introduction: Basic concepts of Control Systems. Classification- Open Loop and Closed Loop Control Systems. Review of various types of measuring instruments and transducers. important components of a Control System, Definition of Transfer Function.(3 hrs)

2. Representation of Control System Components : Study of various types of Control System Components and their mathematical representations used in systems like Mechanical Systems. Electrical Systems. Thermal Systems, Analogies, fluid Systems, grounded chair representation.(6 hrs)

3. Block Diagram Algebra : Basics, rules for solving block diagrams. solving block diagrams for Liquid Level System, Temperature Control System, Speed Control System,etc (3hrs)

4. Signal Flow Diagram : Concept, masons gain formula, generating a signal flow diagram for a system, solving signal flow diagram to find transfer function. (3hrs)

5. Electrical System: Detail Study of various types of Electrical Motors like DC Servomotors, AC Servomotors, control methods, servo mechanisms, position control systems. (3 hrs)

6. Types of Control Actions. : Introduction to various types of output characteristics and their analysis, Basic types Control Actions like ON/OFF, Proportional, integral, Derivative type and their combinations. Viz., Proportional plus integral. proportional plus Derivative, Proportional plus integral plus derivative type of control actions. (6hrs)

.7. Industrial Controllers : Mechanical, Hydraulic and Pneumatic Controllers of Proportional Plus integral, Proportional Plus Derivative, Proportional plus integral Plus Derivative type of control actions, Mathematical treatment of above controllers. (.4hrs)

8. Response Characteristics : Introduction of various types of Standard input signals commonly Used, Definition of Transient and Steady State Response, Characteristics of First Order Systems when subjected to standard input signals, Transient and Steady state Response. Characteristics of Second Order Systems, Specifications etc. (6 hrs)

9. Analysis of Frequency Response : Characteristics of Frequency Response of different functions (limited up to Second Order Systems only), Graphical Analysis. Bode Plots, Nyquist (polar) criterion of stability. Routh's Stability Criterion, use of Matlab software. (6 hrs)

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1) Study of Control System Components (at leasr 10 component)
2) .An experiment on Speed Control of a DC Motor.
3) An experiment on Speed Control of an AC Motor.
4) An experiment on Speed Control of a Stepper Motor.
5) An experiment on a Level Control System
6) An experiment on a Temperature Control System.
7) Study of Controller of a one each NC Machine.
8) At least six assignments on chapter no. 2.3,6,7,8 &9.

Practical Examination
The Practical examination shall be consist of performing experiment based on the practical work done during the course and Viva - voice based on the syllabus.

Recommended Books
1) Automatic Control Systems - by Nagrath Gopal.
2) Control System Engineering - by Ogatta, PHI
3) Automatic Control Systems - by Francis Raven, McGraw Hill.
4) Feedback Control Systems - S. Bhide, JaIgoankar, TechnovaPublications

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Operations Research
(One Theory Paper, 3 hrs., marks :100, Term Work: 50 marks)

1. Introduction
Operations Research: Development, history, definitions, objectives, characteristics, limitations, phases and applications. Optimization models and their classifications. (2 hrs.)

2. Linear Programming:
Formulation of LP problem. Basic Solution. Theorems of LP. Graphical method. Simplex method(minimization I maximization cases). Degeneracy in LP. Duality in LP. Sensitivity analysis, Introduction to integer programming, Dynamic Programming and Non- linear programming.(8 hrs)

3. Transportation Problem:
Introduction, Methods for finding initial solution, Test of toptimality, Maximization Transportation problem, Transshipment problem, Degeneracy. (4 hrs)

4. Assignment Problem:
Introduction. Solution methods, Variations of the assignment problem, Traveling salesman problem.(3 hrs)

5. Sequencing Models:
Scheduling and sequencing, Assumptions in sequencing models, Processing 'n' jobs on 'm' machines,Proce3sing of two jobs on machines with each having different processing order.(3 hrs)

6. Inventory Control System
(Quantitative Approach) :
Introduction, Meaning of Inventory Control, Functional classifications of Inventories. Advantages of Inventory Control, Costs associated with Inventories. Advantages of Inventory Control, Deterministic Inventory Models; economic lot size with instantaneous replenishment with and without shortage costs, economic lot size with finite replenishment with and without shortage, economic lot size models with quantity discount. (3 hrs)

7. Replacement Analysis: Displacement Vs Replacement, Methods of replacement analysis, Uniform gradient serious unacost method. (3 hrs)

8. Queuing Theory:
Queuing Systems: Introduction, cost associated with characteristics, operating characteristics and probability distribution, Classification of queuing models. Kendall's notations. Models : (M/M/I),Minimum cost service rate. (3 hrs)

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9. Theory of Games:
Introduction, two-person zero-sum game, Minimum and Maximum principle, Saddle point, Methods for solving game problems with mixed strategies, Introduction to graphical and iterative models for solving problems. (3 hrs)

10. Network Models:
Introduction to PERT/CPM and its importance in project management. Concepts and construction of network diagrams. Critical path and project duration, floats, network crashing, optimum project duration and cost, PERT activity, time estimates:. probability of completion of a project on or before specified time. Updating of project, Resource allocation and load smoothen ing. (6 hrs)

11. Simulation:
Simulation: Monte-Carlo Method. (2 hrs)

Term Work
Term Work shall consist of at least eight assignments based on the above syllabus.
Recommended Books
1. Gupta P.K. and Hira D.S. : Operational Research. S. Chand & Co. Ltd.
2. Gupta P.K. and Hira D.S. : Introduction to Optimization, Jain Brothers.
3. Askhedkar R.D. and Kulkarni R.V. : Operations Research, Dhanpat Raj & Sons.
4. Patel R.C., Dave N.R. & Manglani A.K.: Operations Research, C. Jamnadas & Co.
5. Sharma J.K : Mathematical Models in Operations Research, Tata McGraw - HilI Publishing Co.
Ltd.
6. Sharma S.D., KedarNath: Operations Research, Ram Nath & Co.
7. Taha H.A. : Operations Research: An Introduction, Prentice Hall of India Pvt. Ltd.
8. Wagner H.N. : Principles of Operations Research with applications to Managerial Decisions,
Prentice Hall of India Pvt. Ltd.
9. Wiest J.D. & Levy F.K. : Managerial Guide to PERT/CPM, Prentice Hall of India Pvt. Ltd.

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Industrial Engineering

(One Theory Paper: 3 hrs, 100 marks, Term Work: 25 marks, Practical Exam: 25 marks)

I. Introduction: Productivity, definitions of work study, scope, applications, relationship, between productivity & standard of living, basic work content, excess work content, Management, techniques to reduce excess work content due to product process and ineffective time in control of workers and Management- (3 hrs)

2. Work Study: Definition, concept, relation with Productivity, human factors, good relations, work study versus Management, supervisor, work study man, qualities of work study man, working conditions, prevention accidents and hazards. (3 hrs)

3. Method Study: Definition, objectives procedure factors affecting selection of work, recording techniques such as outline process short, flow process chart, factory layout, flow diagrams, developing new layout materials handling its principles and equipment, movement of workers and materials in working area, string diagram and its significance, travel chart, multiple activity chart and their significance Micro motion study, two handed process chart, principles, therbligs, simo chart, cycle graph, and use of limits in method study, MOST (7 hrs)

4. Work Measurement: Techniques, Pm-pose, use & basic procedure time study equipment selection of jobs for time study, approach to workers, steps in time study, data collection about jobs, operator & surroundings breaking down jobs into elements, types of elements, selection and measurement of each element. (4 hrs)

5. job Evaluation And Merit Rating: Introduction, Different techniques of job evaluation; Merits, Demerits, Techniques of Merit rating, Significance of Job evaluation / merit rating with work measurement. (3 hrs)

6. Time Study Rating And Allowances: Definition of rating, system of rating, wasting house system of rating skill & effort, synthetic rating & objective rating, use of rating factor, rating the job, normalizing observations, types of allowances, applying the allowances. (3 hrs)

7. Other Works Measurement Techniques: Work sampling need, establishing confidence levels, determination of sample size, ra:1dom observation, conduct of study, use of work sampling. General study of standard data & PMTS. Methods of Improving Materials Productivity, factors affecting materials productivity. Introduction to Business Process Reengineering. (4 hrs)

8. Kaizen : Continuous method improvement, Kaizan concept, Kaizen umbrella for quality improvement. Kaizen and management, implications of QC for Kaizen, kaizen and TQC, Kaizen and suggestion systems, Kaizen and competition, process oriented Management versus result oriented Management, Kaizen and innovation, Kaizen and measurement, PDCA cycle, Kaizen Management. (3 hrs)

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9. Single Minute Exchange of Dies (SMED) : Aspects of setup activities, internal and external setup. Fundamentals of SMED, setup improvement, conceptual stages. Techniques for ,streamlining the aspect of set up, effects of SMED. one minute exchange of die (OTED) (5hrs)

10 Just in Time: Concept, scope, objectives, push & pull system, reduced inventories and improved set up times, source of profit in manufacturing process, TOYOTA production system, basic assumptions of TOYOTA production system, leveling, smoothing out the production system, JIT and automation, workplace control through - the Kaizen system. Customizationofmanufacturing. (5hrs)

Term Work
Minimum Eight assignments based on the above syllabus and minimum two experiments based one each on method study and time study.
Practical Examination
It shall consist of oral based on the term work and the above
syllabus.

Recommended Books
1. Introduction to work study - ILO
2 Motion & Time study Design & Measurement of Work - Ralph Barnes (Wiley Eastern)
3 Work Study - R.M. Currie & J. Faraday. (ELBS Pitman)
4 Hand Book of Industrial Engineering - Irson & Grant.
5 Just In Time: David Hukins
6 Kaizen : Shyam. Talwadekar
7 Kaizen : Masaki Imai
8 SMED : Shino Shingo.

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Simulation & Mathematical Modeling
(One theory paper 100 marks, 3 hrs, Term Work: 50 Marks)

1. Introduction to Simulation: System and System environment, Components of system, Type of systems, Type of models, Steps in simulation. Study, Advantages and Disadvantages of simulation. Simulation Examples: Simulation of Queuing systems (06 hrs)

2. General Principles: Concepts of discrete event simulation, Time-Advance Mechanisms, Component and Organization of a Discrete-Event Simulation Model (4hrs)

3. Statistical models in Simulation: Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution. (4hrs)

4. Queuing Models: Characteristics of Queuing systems, Queuing notations, Long run measures of performance of Queuing systems, Steady state behavior of infinite population Markovian models, Steady state behavior finite population model. [04 hrs]

5. Random Number Generation: Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers.[02 hrs]

6. Random Variate Generation: Inverse transform technique, Conv0lution method, Acceptance rejection techniques. [02 hrs]

7. Input Modeling: Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness-of-fit tests, Selection input model without data, Multivariate and Time series input model. [04 hrs]

8. Verification and Validation of Simulation Model: Length of simulation runs, validation [03 hrs]

9.Output Analysis for a Single Model: Types of simulations with respect to output analysis, stochastic nature of output data, Measure of performance and their estimation. Output analysis of terminating simulators, Output analysis for steady state simulation. [06 hrs]

10. Case Studies: Simulation of manufacturing systems, Simulation of inventory control systems, Simulation of pert network. [04 hrs]

11. Simulation Software: GPSS [01hr]

TERM WORK
Term work should consist of at least 10 Practical experiments and two assignments covering the topics of the syllabus.

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Recommended Books

1. Donald W. Body, "System Analysis and Modeling", Academic Press Harcourt India
2. David Kelton, Randall Sadowski, Deborah Sadowski, "Simulation With Arena", McGraw Hill
3. Jerry Banks, John Carson, Barry Nelson, David Nicol, "Discrete Event System Simulation"

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Costing And Financial Management
(One Theory Paper: 3 hrs, 100 marks, Term-Work: 50 marks)

1. Introduction:
Cost, elements of cost, selling price, costing, cost and financial accounting, cost estimate, types,functions, applications, cost unit and cost centers. (3 hrs)

2. Overheads:
Definition, types, allocation, depreciation, methods of depreciations, calculations of machine hour rates, indirect labor and organizational size. (4 hrs)

3. Tooling cost:
Elements of tooling cost, comparison of different toolings, selection of best tooling, shop orders.NC tapes as tooling. (3 hrs)

4. Equivalence and cost comparison:
Timc valve of money, unacost, capitalized cost; cost comparison with equal duration, unequal duration by present worth, unacost and capitalized cost method. (5 hrs)

5. Break Even Analysis:
Break even point, Economic production. chart, Economic production chart above 100 % capacity, Economic production chart with dumping, Nonlinear break even chart, contribution to sales ratio, Profit path chart, margin of safety. (5hrs)

6. Displacement analysis:
Displacement Vs Replacement, uniform gradient series, Best policy with uniform Gradient series Unacost method, burden, unburden. (3 hrs)

7. Cost estimate and review:
Parts Explosion diagram, estimating material cost, estimating labor cost, making an Initial cost estimate, cost sheet, cost review grid, cost estimate sheet. (5 hrs)

8. Cost control:
Cost control. cost reduction, capital cost control, elements of cost control programme, project planning and scheduling, cost reporting corrective action. Operating cost control: Repetitive nature, standard cost, cost reporting and corrective action. (4 hrs)

9. Budgeting:
Budget, definition, importance, types of budgets, fixed, variable, sales, production, capital expenditure. materials and purchase, direct labor, cash master, introduction to budgetary control.(5 hrs)

10 Finance management:
Investment capital, types, sources of finance. financial accounting. Introduction to profit loss account, balance sheet, financial rations. (3 hrs)

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Term Work
Term work will consist of at least eight assignments based on the above syllabus.
Recommended Books
1.Cost And Optimization Engineering - F. C. Jelen (McGraw Hill).
2. Manufacturing cost Engineering Hand book - Edited by E. M. Malstrom, Mare! Dekkan Inc.
3. Accounting and Financial Management - A.M. Pandey.
4 IndustrialEngineering and Management - O.P. Khanna.
5. Cost & Management Accounting by S. N. Inamdar, Everest Pubishing House.

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DESIGN OF EXPERIMENT

(One Theory Paper: 3 hrs, 100 marks, Term work: 50 marks)

1. Introduction:
Quality: eight dimensions of quality, Customer satisfaction and Quality concept of TQM, TQM axioms, consequences, Key elements of TQC, Two dimensional of quality, TQM Philosophies of Deming, Juran, P. Crosby, Imai, Ishikawa, Conway. (3 hrs)

2. Tools for Quality Improvement:
Alternate Process Control: Cusum control chart, chart for drifting process, multi-vari charts, precontrol. tools, Benchmarking. Quality Circles, The PDCA cycle, Hoshin kanri Plan. (4 hrs)

3. Quality Function Development:
Concept and defining QFD, product deployment system, QFD process, QFD matrix concept. Deployment- part, process. T -type matrix. (3 hrs)

4. ISO 9000 :
Concepts, methods and implementation. Quality management practices world wide, Quality, Customers and ISO 9000, Company quality policy, interpretation of Key ISO 9000 clauses, Implementing ISO 9000, Indian equivalent for ISO 9000. The ISO 9001 :2000, standard steps for certification under IS0900 1: 2000.(4 hrs)

5. Introduction to design of experiment:
Taguchi loss function, desire for low loss, factory tolerance, other loss functions.(3 hrs)

6. Analysis of Variance:
Variation, No-way, One-way, Two-way, three way analysis of Variances. (ANOVA)(5 hrs)

7. Orthogonal Array Design:
Meaning;, necessity, one factor experiment, several factors one at a time, several factors all at the same time, Test strategies. Better test strategies, efficient test strategies step in designing, conducting and analyzing an experiment. (6 hrs)

8. Multi level Experiment: Introduction, necessity, conversion from two to four levels, ANOVA for four level factors, polynomial decomposition, multiple level factor interactions, dummy treatment for three level factors, ANOVA for dummy treatment. (4 hrs)

9. Interpretation of Experimental Results:
Interpretation Methods : Present Contribution, estimating the mean, confidence interval around the estimation mean, Omega transformation of data. (4 hrs)

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10. Parameters & Tolerance Design:
Introduction, control and noise factor. Signal to Noise ratio Parameters design strategy, Analysis of inner /outer array experiment, Tolerance design, quality Counter measures, steps in experimentation (4hrs)

Term Work:
Term work shall consist of at least eight assignments based on the above syllabus.
Recommended Books:
1.Quali!y Planning and Analysis –J.M, Juran, Frank M, Gryna.
2 Total Quality Management – Logothetis
3. Total Quality Management- Banks
4. Total Quality Control Essentials- Sarv singh Soin
5. Taguchi Techniques for Quality Engg.- Phillip J. Ross, Mc Graw Hill Ltd.

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Non Conventional Machining Processes
(One Theory Paper: 3 hrs, 100 marks, Term Work: 50 marks)

I. Tool Technology: - Tool wear and failure: Mechanism of tool wear, measurement of tool wear, tool failure criterion, effect of process parameters on tool life, tool life tests, and tool life improvement by various coatings. New development in tool materials. (3 hrs)

2. Introduction: - Need for non-conventional machining processes, process selection, classification,comparative study of different processes. (2 hrs)

3. Mechanical Processes: - Ultrasonic machining: - Definition, mechanism of metal removal, elements of the processes, tool feed mechanism, theories of mechanism of cutting, effect of parameters, applications and numericals. (4 hrs)

4. Abrasive Jet Machining: - Principle, parameters of the process, applications, advantages ,disadvantages, numericals. (4 hrs)

5. Thermal metal removal processes: - Electric Discharge Machining - principle of operation, mechanism of metal removal, basic EDM circuitry, spark erosion generators, analysis of relaxation type circuit, material removal rate in relaxation circuit, critical resistance parameters in Ro circuits, dielectric fluids, application and numericals. (8 hrs)

6. Electrochemical and chemical processes: - Electrochemical Machining (ECM), classification of ECM process, principle of ECM process, chemistry of the ECM processes, Parameters of the process, determination of the metal removal rate, dynamics of EC~ process, polarization, tool design, advantages and disadvantages, application, electrochemical grinding, Electrochemical honing, Electrochemical deburing. Chemical machining:- Introduction, fundamental principle, types of chemical machining, maskants, etchants, advantages, disadvantages, applications. (6 hrs)

7. Plasma Arc Machining:-Introduction, plasma, general .ion of plasma and equipments, mechanism of metal removal, PAM Parameters, process characteristics, types of torches, applications.(3hrs)

8. Electro Beam Machining (EBM):- Introduction, equipment for production of Electron Beam, theory of EBM, thermal and non-thermal type, process characteristics, applications. (4 hrs)

9. LASER Beam Machining (LBM):- Introduction principle of generation of LASER, equipment and machining procedure, types of lasers, process characteristics, advantages and limitations,applications. (4 hrs)

10. Ion Beam Machining:- Introduction, Mechanism of metal removal and associated equipments,process characteristics and applications. (2 hrs)

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Term Work.
The Term work shall consist of at least eight assignments based on above syllabus and demonstration of AJM / ECM / LBM /EDM at least any two types of the processes.

Recommended Books

1. HMT "Production technology"
2. Bhattacharya:- "New technology" Institution Of Engineers
3. Ghosh. Mallik:- '"Manufacturing Science"- Everest Publications
4. P.C. Pandey and HS. Shah: - "Modern Machining Processes~" Tata McGraw Hill
5 V. K. Jain Advanced Machining Processes-;. Allied Publishers

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Project-II

(Term work 50 marks, Practical Examination 100 marks)

Every student or group of students should undertake a project work under the guidance of a teacher. The project work could be a theoretical work on trouble shooting, design development and fabrication of prototype /model (wherever necessary). THE STUDENT/S SHOULD GET HIS/THEIR TOPIC OF THE PROJECT APPROVED FROM THE PRINCIPAL IN THE FIRST TERM ONLY. The report of the project, in duplicate, should be submitted by every student as per the instructions and in the format given below:

Instructions:

1. The project report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 or 2.0 using black ribbon or carbon on one side of the paper.
3. Margins:- (i) Left 37.5 mm.
(ii) Right, top and bottom 25 mm.
4. Binding:- Hard with golden embossing on the front cover of blue colour or soft comb binding with transp8.rent front cover and non transparent plastic blue/black cover.
5. From: cover in case of hard bound report:
It should be identical to first title page.
6. Format for title page (First Page)
Report of the project
on
(Title of Project)
by
(Name of student)
Submitted in partial fulfillment of the requirements for the degree of Bachelor of Engineering (Production)
Department of Production Engineering
(Name of the college)
7. Format for Certification page (i.e. Second page)
CERTIFICATE
This is to certify that the project entitled
"Title of Project"
Submitted by
(Name of Student/s) .
is completed as per the requirements of the Dr. Babasaheb Ambedkar Marathwada University in partial fulfillment of degree of
B.E.(Production)
For the academic year--------
Guide Head of Department Principal
8. The third page would be for acknowledgements which would be followed by index page/so
9. Sketches should be drawn on separate sheet (minimum A4 size) and be inserted at proper places. The sketches should be drawn in black ink and be numbered.
10. Tables should preferably typed in the text only.

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11. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
12. The last item on the index should be references