

Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

B.E. VII SEMESTER

S. No.	Board of Study	Sub. Code	SUBJECT	PERIODS PER WEEK			SCHEME OF EXAM Theory/Practical			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Mech. Engg	337731(37)	Automobile Engineering	3	1	-	80	20	20	120	4
2.	Mech. Engg	337734(37)	Machine Tool Technology	4	1	-	80	20	20	120	5
3.	Mech. Engg	337733(37)	Computer Aided Design & Manufacturing	4	1	-	80	20	20	120	5
4	Mech. Engg	381732(37)	Production Planning & Control	4	1	-	80	20	20	120	5
5	Refer Table - II		Professional Elective-II	4	1	-	80	20	20	120	5
6	Mech. Engg	381761(37)	Automobile Engineering Lab	-	-	3	40	-	20	60	2
7	Mech. Engg	381762(37)	Production Planning & Control Lab	-	-	3	40	-	20	60	2
8	Mech. Engg	381763(37)	Computer Aided Design and Manufacturing Lab	-	-	3	40	-	20	60	2
9	Mech. Engg	381764(37)	Minor Project	-	-	3	100	-	40	140	2
10	Management	381765(76)	Innovative & Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Mech. Engg	381766(37)	** Practical Training Evolution/Library	-	-	1	-	-	40	40	1
Total				19	5	15	620	100	280	1000	34

L – Lecturer

T – Tutorial,

P – Practical,

ESE – End Semester Exam,

CT – Class Test

TA – Teacher's Assessment

**To be completed after VI sem. and before the commencement of VII Sem.

Table – II

Professional Elective - II

S.No.	Board of study	Subject Code	Subject
1	Mechanical	381741(37)	Non Destructive Testing Methods
2	Mechanical	381742(37)	Material Management
3	Mechanical	381743(37)	Flexible Manufacturing System
4	Mechanical	381744(37)	Machine Vision
5	Mechanical	337745(37)	Numerical Control of Machine Tool
6	Mechanical	381746(37)	Management Information System
7	Mechanical	381747(37)	Advanced Foundry Technology

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SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Automobile Engineering

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 337731(37)

Total Tutorial Periods: 12

UNIT-I

Chassis & Frame - Layout of chassis & its main components, types of frames, conventional frames & unitized chassis.

Suspension system & Springs -Objects & principles of suspension, system, types, rigid axle suspension & Independent suspension for front & rear ends, simple & double arm parallel & perpendicular type of suspension system. Gas filled suspension system.

Springs - Purpose, types viz. leaf, coiled, rubber, air, suspension system, torsion bar, stabilizer, Telescopic damper.

UNIT – II

Clutches

Characteristics, functions, principles of operation of clutch, friction clutch, single plate, multi plate, centrifugal clutch, positive clutch, friction plate clutch lining materials. Torque transmitted and related problems.

Fluid flywheel

Construction, principles of working & characteristics.

UNIT – III

Gear Box: Object of Gear Box, Air, rolling & gradient resistance, tractive effort variation with speed, performance curve.

Types of Gear Boxes:- Sliding mesh, constant mesh, synchromesh device, automatic transmission, overdrive, lubrication of gear box.

Torque converter: Principles of working, characteristics, Torque converter with direct drive.

Testing of automobiles.

UNIT – IV

Universal Joint:- Types, propeller shaft, slip joint.

Differential – Functions, single & double reduction differential, limited slip differential.

Front Axle: Live & dead axle, stub axle.

Back Axle: Hotch kiss drive, torque tube drive.

Tyres: Types specification, causes of tyre wear & rim.

Brakes & Braking system: Purpose, principles, layout of braking system. Classification, mechanical, hydraulic, master cylinder, Tandoma master cylinder wheel cylinder, self energizing & self adjusting brakes, disc brakes, antiskid brakes.power operated brakes:

UNIT – V

Steering system:- Gear & links, types of steering gears, reversibility of steering, center point steering, steering geometry viz castor, camber, king pin inclination toe in, toe out, cornering power, under-over steer; power steering, effect of shimmy, condition of true rolling, calculation of turning radius. Correct steering equation and related problems.

Electrical System: Battery construction, maintenance, testing and charging, cut out, lighting circuit, horn, signals etc.

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B.E. MECHANICAL ENGINEERING (PRODUCTION)

TEXT BOOKS

1. Automobile Engineering – Kripal Singh – Standard Publications
2. Automobile Engineering – G.B.S. Narang – Khanna Publishers

REFERENCE BOOKS

1. Automobile Engineering - Dr. N. K. Giri – Khanna Publishers
2. Automobile Engineering – K. R. Govindan – Anuradha Agencies
3. Automotive Mechanics – Heitner
4. Motor Vehicle – Newton & Steeds – Life & Sons Limited.

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SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Machine Tool Technology

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 337734(37)

Total Tutorial Periods: 12

UNIT - I

Cutting Tool – types, requirements, specification & application

Geometry of Single Point Cutting Tool - tool angle, Tool angle specification system, ASA, ORS and NRS and inter-relationship.

Mechanics of Metal Cutting

Theories of metal cutting, Chip formation, types of chips, chip breakers, Orthogonal and Oblique cutting, stress and strain in the chip, velocity relations, power and energy requirement in metal cutting.

UNIT - II

Machinability

Concept and evaluation of Machinability, Mechanism of Tool failure, Tool wear mechanism, Tool life, Tool life equation, Machinability index, factors affecting machinability.

Thermal Aspects in Machining and Cutting Fluid

Source of heat in metal cutting and its distributions, temp measurement in metal cutting, function of cutting fluid, types of cutting fluid.

UNIT – III

Design of Machine Tool Element

Design of Lathe bed, Material and construction feature, various bed section, analysis of force under headstock, tail stock and saddle, torque analysis of lathe bed, bending of lathe bed, designing for torsional rigidity, use of reinforcing stiffener in lathe bed. Design of Guide ways, Material and construction features, over turning diagram, Antifriction guide ways.

UNIT – IV

Design of Speed Gear Box

Drives in Machine Tool, classification, selecting maximum and minimum cutting speeds, speed loss, kinematic advantage of Geometric progression, kinematic diagrams, design of Gear Box of 6,9,12 and 18 speed.

UNIT – V

Design of Feed Gear Box

Elements of feed gear box, classification-Norton drive, draw key drive, Meander's drive, Design of feed gear box for longitudinal and cross feed and for thread cutting.

Machine Tool Installation and Maintenance

Machine Tool installation, Machine Tool Maintenance, lubrication, reconditioning of machine tool.

Machine Tool Testing

Testing, Geometrical checks, measuring equipment for testing, acceptance test for Lathe and Radial drilling machines.

TEXT BOOKS

1. Machine Tool Engineering – G.R. Nagpal – Khanna Publishers, New Delhi
2. Fundamentals of Metal Cutting & Machine Tool – B.L. Juneja, G.S. Sekhan, Nitin Sethi – New Age Publishers – New Delhi
3. Machine and Machine tools by Dr. A B. Chattopadhyay

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REFERENCE BOOKS

1. Production Engineering – P. C. Sharma – S. Chand & Company – New Delhi
2. Production Technology – R.K. Jain – Khanna Publisher – New Delhi
3. Principle of Metal Cutting - G.C. Sen, A. Bhattacharya – New Central Book Agency (P) Ltd., Calcutta
4. Machine Tool Practices – Kibbe Richard R – PHI, New Delhi
5. Principles of Machine Tool – G.C. Sen, A. Bhattacharya – New Central Book Agency, Calcutta

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SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Computer Aided Design & Manufacturing

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 337733(37)

Total Tutorial Periods: 12

UNIT – I

Introduction CAD/CAM

The influence of computers on manufacturing environment, Introduction of CAD/CAM, the product cycle & CAD/CAM, automation and CAD/CAM, the common database as linkage to various computerized applications. Product engineering, Benefits of CAD/CAM, Concurrent engineering.

UNIT – II

Geometric Modeling

Data base: Design database concept, objectives, data structures, creation of data files in application programs and relational database management system. Requirement of Geometric Modeling, Geometric models, Geometric construction Methods, other modeling methods, curve representation, desirable modeling facilities & rapid prototyping. 3D representation of surfaces and solids; Plane surface, surfaces of revolution, Bezier surfaces, spline surfaces, Solid entities, basic set theory.

UNIT – III

Numerical Control

Introduction to Numerical Control, Basic components of an NC system, the NC procedure, NC coordinate systems, NC motion control systems, applications of Numerical Control, Introduction to Computer Control in NC, problems with conventional NC, Computer Numerical Control, Direct Numerical Control, Combined DNC/CNC system, Adaptive control machining system,

NC Part Programming

Introduction to NC Part Programming, Manual part programming, Computer assisted part programming, the APT (Automatically Programming Tool) language, MACRO statement in APT, Advantages of CAD/CAM in NC programming.

UNIT – IV

Group Technology

introduction to group technology, part families, parts classification & coding, three parts classification & coding system, group technology machine cells, benefits of group technology

Computer integrated manufacturing (CIM) system

Introduction of CAPP, Flexible manufacturing system, benefits.

UNIT V

Finite Element method

Introduction, types of analysis, general procedure of finite element analysis- stiffness matrix, solution procedure, one dimensional problem.

TEXT BOOKS

1. CAD/CAM Principles & Applications – P.N. Rao – TMH Publication
2. CAD/CAM Computer Aided Design & Manufacturing – Mikell P. Groover, Emory W. Zimmer – Pearson Education
3. Concept and application of Finite element analysis, R D Cook, John Wiley

REFERENCES BOOKS

1. CAD/CAM Theory & Practice – Ibrahim Zied – TMH Publication
2. CAD/CAM – Surendra Kumar & A.K. Jha – Dhanpat Rai & Company

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SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Production Planning and Control

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381732(37)

Total Tutorial Periods: 12

Unit-I

Production Processes: Types and characteristics of production systems, Objective and functions of Production, Planning & Control, discrete and process types, mass, batch, unit flexible manufacturing types, manufacturing operations: selection of a process, difference between manufacturing and service operations, classification of manufacturing processes, 5 Ps in the organization.

Process Design: Systems approach to process planning and design, linkage between product planning and process planning, distinction between process planning and facilities planning, types of process design, product mix, process planning aids, process design procedure.

Unit-II

Aggregate Planning: Concept, strategies for aggregate planning: three pure planning strategies, graphical method for aggregate output planning, master production scheduling (MPS), and procedure for developing MPS.

Resource Requirements Planning: Nature, resource requirement planning system, MRP-I, MRPII, MRP Computational procedure, issues in MRP, implementation of MRP, evaluation of MRP, Introduction to ERP.

Unit-III

Shop floor planning and control: Nature, factors determining production planning, factors determining production control, phases in production planning and control, limitations of PPC, measuring effectiveness of PPC, production activity control, operations planning and scheduling, scheduling process-focused production systems, scheduling techniques for job shop, stages in scheduling, load charts and machine loading charts, dynamic sequencing rules, scheduling product –focused systems, scheduling for flexible manufacturing system.

Unit-IV

Manufacturing planning & Control systems: JIT, CIM, CAPP and WCM.

Learning curves in services and manufacturing: Applying the learning curve, arithmetic approach, logarithmic approach, learning - curve coefficient approach; strategic implications & limitations of learning curves.

Unit-V

Product standardization & value engineering

Production standardization variety reduction. Use of Preferred numbers in standardization. Introduction & scope of value engineering. Evaluation of part function, cost and worth. Application of value engg methodology, simple value engineering case studies.

Text books

1. Vollmann Thomas E, Bery William L, Why bark D Clay, “*Manufacturing Planning and Control Systems*” Galgotia Publications, New Delhi (2002).
2. Buffa, “*Modern Production/operations Management*”, Wiley Eastern, New York (1999).
3. Muhlemann Alan, Oakland John and Lockyer Keith, “*Production and Operations Management*”, Macmillan India Publications Ltd. (2001)

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4. Panneer Selvan R, "*Production and Operation Management*", Prentice Hall India, New Delhi (2002).
5. Aswathappa K and Bhat K Shridhara, "*Production and Operations Management*", Himalaya Publishing House, Mumbai (2002).

References:

1. Industrial Engineering&Management-Dr.A.K Singh, Satya Prakashan.
2. Industrial Engineering-Ravi Shankar
3. Production Planning & Control – Jain and Agrawal
4. Elements of Production Planning & Control –Eilon
5. Operations Management – Buffa.
6. Facilities Planning &Layout-Topmpkins & White

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B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Non Destructive Testing Methods.

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381741(37)

Total Tutorial Periods: 12

UNIT-I

Non-Destructive Testing: An Introduction

Introduction to various non-destructive methods, Comparison of Destructive and Non destructive Tests, Visual Inspection, Optical aids used for visual inspection, Applications.

UNIT-II

Liquid Penetrant Testing and Magnetic Particle Testing

Physical principles, procedure for penetrant testing, Penetrant testing materials, Penetrant testing methods, Applications Principle of MPT, Magnetising technical and procedure used for testing a component , Equipment used for MPT, Applications.

UNIT III

Eddy Current Testing and Acoustic Emission Testing

Principles, Instrumentation for ECT, Various Techniques, High sensitivity Techniques, Single, Multi and high frequency ECT, Applications. Principle of AET, AE signal parameters, Applications.

UNIT -IV

Ultrasonic Testing

Principle, Ultrasonic transducers, Inspection Methods, Normal Incident Pulse-echo Inspection, Through - transmission Testing, angle Beam Pulse-echo testing, Techniques for Normal Beam Inspection, Ultrasonic Flaw detection Equipment, Modes of display, Ascan, B-Scan & C- Scan- Applications.

UNIT V

Radiography, Comparison and Selection of Ndt Methods

Basic principle, Effect of radiation on Film, Radiographic imaging – Inspection Techniques – Single wall single image, Double wall Penetration & Multiwall Penetration technique – Comparison and selection of various NDT techniques.

Text Books

1. Baldev raj, T Jeyakumar, M. Thavasimuthu “Practical Non Destructive Testing” Narosa publishing house, New Delhi, 2002.

Reference Books

1. Krautkramer. J., “Ultra Sonic Testing of Materials”, 1st Edition, Springer – Verlag Publication, New York, 1996.
2. Peter J. Shull “Non Destructive Evaluation: Theory, Techniques and Application” Marcel Dekker, Inc., New York, 2002
3. www.ndt.net
4. Baldev Raj and B.Venkataraman, “Practical Radiology”, Narosa Publishing House, 2004
5. Birchan.B, “Non-Destructive Testing”, Oxford, London, 1975

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SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Material Management.

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381742(37)

Total Tutorial Periods: 12

Unit-1

Introduction: integrated materials management concept. objectives, organizational structure, material cycle.

Make/Buy Decisions: factors, financial and manufacturing aspects.

Unit -2

Materials Forecasting: general economic forecast, major cyclical indicators, forecasting the price, materials requirement planning.

Purchasing: Functions, procedures, documents used as per ISO / QS 9000, policies, types of purchasing - hand to mouth, forward buying, speculative buying, commodity markets, price cost analysis, negotiations.

Unit -3

Selecting sources of supply, vendor evaluation and rating, vendor development.

Purchase research, value analysis, introduction to legal aspects of purchasing.

Unit -4

Inventory Management: Basic concepts, need, deterministic and probabilistic EOQ models, inventory analysis, ABC and VED, Inventory Control Techniques fixed quantity, periodic review system, Spare Parts Inventory Management, safety stock determination.

Recent Trends In Inventory Management: Zero inventory, JIT concept and tools.

Unit -5

Stores Management: Objectives, stores layout, storage system and equipment, automated storage and retrieval stores, procedures as per ISO / QS 9000, material classification and codification as per ISO / QS 9000, materials accounting system.

Materials Management: Management performance evaluation, information systems and computers in materials management.

TEXT BOOK

1. Materials Management - Dean S. Ammer (Taraporwalla & Sons)
2. Purchasing Management- J.H. Westing, I.V. Fine C.J. Zenc (John Wiley and Sons)

REFERENCE BOOKS

1. Purchasing & Materials Management - Lamer Lee Jr... Donad W. Dobler (TMH)
2. Integrated Materials Management- A. K. Dutta (S. Chand & Co.)
3. Stores House and Stock management - H. K. Compton (Business Books Ltd.)
4. Storage Controls & Stocks - Alex Morrison (ELBS)
5. Purchasing and Materials Management- P. Gopalkrishnan (TMH)
6. Materials Management - A. K. Dutta (PHI)
7. Stores Management – K.S.Menon (MACMILLAN)

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SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Flexible Manufacturing System.

Branch: Mechanical Engg. (Production)

Total Theory Periods: 50

Code: 381743(37)

Total Marks in End Semester Exam: 80

Total Tutorial Periods: 12

Minimum number of class tests to be conducted: 2

Unit-1

Introduction: Flexible and rigid manufacturing, Concept of F.M. Cell and F.M. System, Functions of a manufacturing cell, Types and components of FMS, Tests of flexibility, Group Technology and FMS, Optimization of FMS, Tasks in selection of FMS

Control structure of FMS: Architecture of typical FMS, Automated work piece flow in FMS, Hierarchical control system architecture of FMS – Factory level, Cell level and Equipment level; Factory networks, Distributed Numerical Control (DNC), unmanned operation, FMS Diagnostics.

Unit-2

Production Scheduling in FMS: Shop Floor Control system, phases in SFC, Variable route part programming system in FMS, dynamic scheduling in FMS, procedure, Performance analysis of FMS – measures, Deadlocks in automated manufacturing systems- handling deadlocks.

Tooling in FMS: Tool holders for CNC machines, modular tooling, tool monitoring; preset, offset and wear compensation values, robotized tool assembly, tool database, tool management system, tool flow control in FMS.

Unit-3

Fixturing in FMS: Palletizing of parts, pallet pool, flexible fixturing – principles and methodologies, standard fixtures, modular fixturing system – T-slot based and dowel pin based and their components; Computer aided fixture design – approaches, use of GT in fixture design – fixture design process, fixturing structure and fixturing information tree, fixture database.

Unit-3

Database Management Systems in FMS: Conceptual DBMS, types of data structures and their applications in FMS, Integrated DBMS in FMS and its implementation.

Material Handling in FMS: Functions of an integrated material handling system in FMS, Flexibilities in material handling, Layouts in FMS, Industrial robots for load unload applications, Robotic cell layouts; **Automatically Guided Vehicles (AGVs)** – types, Control of AGVs- Wire guided, optically guided, dead reckoning, free ranging AGVs, Scheduling of AGV, Storage and retrieval machines in AS/RS,

Unit-4

Automated Inspection Systems: In-process gauging, Coordinate Measuring Machines applications, Probes – various shapes, types and applications, programming of CMMs, Types of CMM software, Inspection routines / cycles on CMM for various measurements - manual and programmed, CNC machines as CMM.

Designing FMS: Simulation – Need, techniques, inputs, procedure, performance analysis.

Unit-5

Flexible Assembly Systems: Basic concepts, classification, planning and scheduling in FAS, loading and scheduling in F.A. cells.

Reconfigurable Manufacturing Systems: Definition, goals, elements, rationale, characteristics, principles, RMS and FMS

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B.E. MECHANICAL ENGINEERING (PRODUCTION)

TEXT BOOK

1. Ranky, Dr. Paul, (1984), “The Design & Operation of FMS”,
2. Groover, Mikell P., 3/e, “Automation, Production Systems & Computer Integrated Manufacturing”, Pearson Education or PHI
3. Viswanadhan, N. & Narahari, Y., “Performance Modelling of Automated Manufacturing Systems” 2/e, PHI
4. Pinedo, Michael & Chao, Xiuly (1999), “Operations Scheduling with Applications in Manufacturing & Services”, McGraw Hill International Editions (with LEKIN Scheduling Software, also available on INTERNET)

REFERENCE BOOKS

1. Kelton, Sadowsky & Sadowsky, “Simulation with ARENA”, 2/e, McGraw Hill International Editions (with CD of ARENA Simulation Software)
2. CAD/CAM/CIM, 3/e – Radhakrishnan, Subramanayam & Raju (New Age International)
3. Rao, PN, Tewari NK, Kundra TK, “Computer Aided Manufacturing“, TMH
4. Rong, Yeming; “Computer Aided Fixture Design”, Marcel Dekker, ISBN 0-8247-9961-5
5. Sewik, “Production Planning & Scheduling in Flexible Assembly Systems”, Springer Verlag, ISBN 3-540-64998-0
6. Koren, Y.: Computer Control of Manufacturing Systems. McGraw-Hill Book Co., New York,
7. Computer Aided Manufacturing - Chang, Wysk & Wong (Prentice Hall of India)
8. Changeable and Reconfigurable Manufacturing Systems (Springer Series in Advanced Manufacturing) (Ed. Hoda A. Elmaraghy)
9. Computer Integrated Manufacturing- A. Alavudeen & N.Venkateshwaran, (2008), (PHI), ISBN-978-81-203-3345-1
10. Planning and Scheduling in Manufacturing and Services- Pinedo, Michael, (2005), Springer, ISBN 0-387-22198-0 (with CD)
11. CAD/CAM –Concepts & Applications, - Channakesava R. Alavala, (2008), (PHI) ISBN-978-81-203-3340-6

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SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Machine Vision

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381744(37)

Total Tutorial Periods: 12

UNIT I

INTRODUCTION TO MACHINE VISION

Machine Vision use of machine vision – tasks for a vision system – relation to other fields – place of vision in CIM.

UNIT II

IMAGE ACQUISITION AND CONVERSION

Colour systems – light sources – lighting techniques – image formation by lensing – image scanning – television cameras – sensors, charge coupled devices – camera and system interface – frame buffers and frame grabbers – digital and smart cameras.

UNIT III

IMAGE PROCESSING DECISION MAKING

Processing of binary images – thresholding, geometrical properties, topological properties – processing of gray scale images statistical operations, spatial operations, segmentation edge detection, morphological operations – image analysis – factors extraction – decision making.

UNIT IV

PATTERN RECOGNITION

Fundamentals – parametric classifiers – nonparametric, classifiers nearest neighbor CART, neural networks, generic classifiers.

UNIT V

MACHINE VISION APPLICATIONS

Applications in user industries automotive, semiconductor, electronic manufacturing, printing industries etc. – generic applications founding manufacturing metrology, inspection assembly verification – application analysis and implementation.

TEXTBOOK

1. Milan sonka, Vaclav hlavac, roger boyie, "Image Processing", "Analysis and machine vision" Cengage Learning India Pvt Ltd (2008)

REFERENCES:

1. Richard O.Duda, Peter E. Hurt, Pattern Classification and Scene Analysis Publisher, 1973
2. Rafael C. Gonzales, Richard E. Woods, Digital Image processing publisher, 1992
3. Nella zuech, 'Understanding & applying machine vision Marceldekker Inc. 2000..

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SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Numerical Control of Machine Tools

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 337745(37)

Total Tutorial Periods: 12

UNIT - I

Introduction

Fundamentals of numerical control, advantages limitations of N.C systems -classification of N.C systems.

Computer Numerical Control

Nomenclature, types and features of CNC machine tools. . Machine control unit. Position control and its significance. Engineering analysis of NC positioning systems. Open loop and closed loop systems. Precision in NC positioning systems: control resolution, accuracy and repeatability. Actuators: servomotors, stepper motors, transducers and feedback elements.

UNIT - II

Features of N.C. Machine tools

Design consideration of N.C machine tools - increasing productivity with N.C machines, tooling for CNC machine.

System Device

Feedback system-counting devices digital analog converters

Interpolations

DDA integrators, simple and symmetrical DD reference word CNC interpolators.

UNIT - III

Part Programming

Process planning and flow chart for part programming. systems, nomenclature and tool geometries. Tool presetting & Modular Tooling. Selection of tools based on machining capacity, accuracy and surface finish. Elements of programming for turning and milling. part programming. Preparatory codes G, Miscellaneous functions M. Interpolation, Tool compensations, cycles for simplifying programming. Typical part programming

Control Loops for N C Systems

Introduction-control loops for point and counting systems.

UNIT - IV

Computerized Numerical Control

CNC concepts-advantage of CNC reference planes, sampled data techniques, microcomputers in CNC.

Adaptive Control Systems

Adaptive control with optimization, and constraints-variable gains AC systems.

UNIT - V

Modern CNC machines

CNC lathes. Turning centers. Machining centres. Automatic pallet changers. Automatic tool changers. Direct numerical control and applications. CNC machine design features.

TEXT BOOKS

1. Automation, Production Systems and Computer Integrated Manufacturing - Mikell P. Groover - PHI, 2001.
2. CNC Programming - S.K. Sinha - Galgotia Publications 2003.

REFERENCE BOOKS

1. HMT Mechatronics - Tata McGraw Hill
2. numerical control of machine tool by urie and koren

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SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: Management Information System

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381746(37)

Total Tutorial Periods: 12

Unit-1

Managing the digital firm: Concepts, need and scope of Information system in business organization, the competitive business environment and the emerging digital firm, transformation of business enterprise, major business functions, approaches to the development of an organization's information system; technical approach, behavioral approach, socio – technical approach, new options for organization design, the Network revolution, Internet and its functions, World Wide Web, LAN etc., positive & negative impacts of information systems.

Unit-2

Information systems in the enterprise: Organizational levels, subsystems of information system; Operational level, knowledge level, management level and strategic level information systems, transaction processing systems, office systems, knowledge work systems, MIS, DSS, ESS, Relationship of systems to one another, systems from a functional perspective, life cycle of information system.

Unit-3

Managing data resources: Components of computer based information system (CBIS), file Organization terms & concepts, problems with traditional file environment, Database Management System (DBMS), types of Databases, Relational DBMS, hierarchical & network DBMS, Object oriented databases. Datamining.

Logical database design: Entity relationship diagram, properties of tables, update anomaly, Insertion anomaly, deletion anomaly, inconsistency anomaly, repeating groups, primary key and concatenated key, Normalisation, 1NF to 2NF to 3 NF steps.

Unit-4

Artificial intelligence: Expert system, features of an expert system, heuristic and algorithm, human expertise vs. artificial expertise, knowledge representation: rule-based methods & frame based methods, tasks and stages of expert system development and difficulties in developing an expert system.

Unit-5

Computer simulation: concept of simulation, when is simulation an appropriate tool, when simulation is not appropriate, advantages and disadvantages of simulation, areas of application, systems & system environment, components of a system, discrete & continuous systems, model of a system, types of models, steps in a simulation study, simulation application examples, selecting simulation software.

TEXT BOOKS

1. Laudon Kenneth C and Laudon Jane P, "*Management Information Systems*", Pearson Education Asia, Eighth Edition (2004)
2. Donald A Waterman, "*A Guide to Expert Systems*", Pearson Education Asia, Third Indian Reprint (2002)

REFERENCE BOOKS

3. Banks Jerr "*Discrete Event System Simulation*", Pearson Education Asia, Third Edition (2001)
4. Davis & Olson, "*Management Information Systems*", McGraw Hill International Editions.
5. Parker & Case, "*Management Information Systems*", McGraw Hill International Editions.

Chhattisgarh Swami Vivekanand Technical University, Bhilai
SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: VII

Subject: ADVANCED FOUNDRY TECHNOLOGY

Total Theory Periods: 50

Total marks in End Semester Exam: 80

Minimum number of class tests to be conducted: 2

Branch: Mechanical Engg. (Production)

Code: 381747(37)

Total Tutorial Periods: 12

Unit-1

Trends and Scope In Foundry Industry: Position of foundry industry worldwide and in India, analysis of data in respect of production and demand, recent trends in quality specifications like dimensional accuracy, surface finish and property requirements, specifications, properties and applications of modern cast alloys- SG iron, Al – alloys, Cu- alloys, Zn – alloys.

Design considerations in manufacturing of patterns and dies: Computer Aided pattern design and manufacture, pattern making machines and equipments, Computer aided design of dies in die casting and centrifugal casting, materials used – epoxy resins and heat treated Al alloys, allowances in patterns and dies

Unit-2

Design of Gating System: Elements and types of gating systems, gating ratio pressurized and non-pressurized gating, systems- applications, Risers – types and functions of risers, directional solidification – factor affecting and significance, use of exothermic sleeves, bricks, chills and their types, types and uses of filters, computer aided design for gating and rise ring systems.

Principles of Solidification: Nucleation kinetics, fundamentals of growth, solidification of single-phase alloys, solidification of eutectic alloys

Unit-3

Melting Practices and Furnaces for Ferrous and Non- ferrous Alloys: Melting practices of Al- alloys, Mg – alloys, Cu – based alloys and Zn- based alloys and SG Iron; Degassing process and methods in Al – alloys, modification treatment in Al- alloys, use of covering fluxes to avoid oxidation; Furnaces used - oil and gas fired furnaces, induction furnaces, rotary furnaces, arc furnaces; Desulphurization, spheroidisation treatment, inoculation practice, de-oxidation and alloy additions; Principle of working of thermocouples, spectrometers, and C.E. meters – applications; use of pyrometers for temperature measurement and control, energy saving in melting practices.

Unit-4

Modern Molding and Core Making Processes and Equipments: Various types of sands used for molding and core making, testing of sand, high pressure line molding, Dissamatic, chemically bonded sands; shell molding binder, hardener and type of sand used in shell molding, procedure used for making shell sand, plants used, properties and tests on shell sand, stick point strength, advantages and applications; Resin bonded sands, alkyl resins, phenolic resins and furnace sands, cold box method of core making advantages and applications, ceramic molding, vacuum molding, sand reclamation importance, methods and plants.

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SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Unit-5

Special Casting Processes: Investments casting processes and applications; Continuous casting, principle, processes and applications; Die casting, low pressure /gravity, pressure and squeeze, advantages, limitations and applications, centrifugal casting, calculations of various parameters in centrifugal casting, die temperature, rotational speeds, advantages, limitations and applications of centrifugal casting, defects in centrifugal casting.

TEXT BOOKS

- 1) Principles of Metal Castings - Heine, Loper and Rosenthal (TMH)
- 2) Principles of Foundry Technology - P.L. Jain (TMH)

REFERENCE BOOKS

- (1)ASM Handbook – Vol. 15 Castings. (McGraw Hill)
- (2)Metal Castings – Principles & Practice - T.V. Ramana Rao. (New Age International Pvt. Ltd.
- (3) Mechanization of Foundry Shops – Machine Construction - P.N. Aeksenovn (MIR)
- (4) Fundamentals of Metal Casting Technology - P.C. Mukherjee (Oxford, IBH)
- (5) Foundry Engineering – Taylor, Fleming & Wulff (John Wiley)

Chhattisgarh Swami Vivekanand Technical University, Bhilai
SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: **B.E. VII Sem.**

Subject: **Automobile Lab**

Total Practical Periods: **28**

Total Marks in End Semester Exam: **40**

Branch: **Mechanical Engg. (Production)**

Code: **381761(37)**

STUDIES TO BE CARRIED OUT (MINIMUM TEN EXPERIMENTS)

1. Study of Frame and Chassis.
2. Study of Clutches – Single Plate, Multi Plate and Centrifugal
3. Study of Gear Boxes – Sliding mesh, Constant mesh, Synchro mesh.
4. Study of Differential, Universal joints, Axles and Slip Joints.
5. Study of Brakes – Mechanical, Hydraulic, Air Brake and Disc Brake.
6. Study of Steering System used with Rigid Axle suspension and independent suspension system, Power Steering
7. Study of different types of springs used in Automobiles.
8. Study of Rigid Axle suspension system.
9. Study of Front Independent Suspension System.
10. Study of Rear Independent Suspension System.
11. Study of Battery, Staring and Generating System and Battery Charging System.
12. Study of Automotive Electrical System.
13. Study of Educational Car Model.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Working model of Single plate, Multi-plate & Centrifugal Clutch
2. Working model of Actual Differential System
3. Working model of Universal Joint, Axles & Slip Joints
4. Working model of Mechanical, Hydraulic and Air Brake
5. Working model of Steering System used with Rigid Axle suspension System
6. Working model of Steering System used with Independent Suspension System
7. Different types of Springs used in Automobiles
8. Working model of Rigid Axle Suspension System
9. Working model of Front Independent Suspension System
10. Working model of Rear Independent Suspension System
11. Working model of Battery, Staring and Generating System along with Charging unit
12. Working model of Electrical System
13. Cut section of Actual Master Cylinder of Hydraulic Brake System
14. Educational Car Model

Chhattisgarh Swami Vivekanand Technical University, Bhilai
SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: **B.E. VII Sem.**

Subject: **CAD/CAM Lab**

Total Practical Periods: **28**

Total Marks in End Semester Exam: **40**

Branch: **Mechanical Engg. (Production)**

Code: **381763(37)**

EXPERIMENTS TO BE PERFORMED

CAD (MINIMUM FIVE EXPERIMENTS)

1. Introduction & different features of the CAD Software
2. 2-D Drafting
3. 3-D Modeling
4. 3-D Advanced Modeling
5. Assembly modeling
6. Feature Modification and Manipulation
7. Detailing
8. Sheet Metal Operations
9. Surface Modeling
10. One Dimensional problems of Finite Element Method.

(These exercises may be performed by any of the following Advanced CAD Software)

CAM (MINIMUM FIVE EXPERIMENTS)

1. To prepare part programming for plain turning operation.
2. To prepare part programming for turning operation in absolute mode.
3. To prepare part program in inch mode for plain turning operation.
4. To prepare part program for taper turning operation.
5. To prepare part program for turning operations using turning cycle.
6. To prepare part program for threading operation.
7. To prepare part program for slot milling operation.
8. To prepare part program for gear cutting operation.
9. To prepare part program for gear cutting using mill cycle.
10. To prepare part program for drilling operation.
11. To prepare part program for multiple drilling operation in Z-axis.
12. To prepare part program for multiple drilling in X-axis.
13. To prepare part program for multiple drilling in X and Z axis using drilling cycle.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Computer Numerically Control Lathe Trainer
2. P-IV (IBM) 2.6 GHz, 80 GB HDD, 256/512 SD RAM (As Compatible with CAD Software) 52 X CD RW, 1.44 MB FDD, 17" Colour Monitor, Laser Scroll Mouse
3. Software – Pro-E, Solid-work, CATIA, ANSYS
4. CNC Controlled Milling Machine
5. CNC Controlled Drilling Machine

Chhattisgarh Swami Vivekanand Technical University, Bhilai
SCHEME OF TEACHING AND EXAMINATION
B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: **B.E. VII Sem.**

Branch: **Mechanical Engg. (Production)**

Subject: **Production planning & control Lab**

Code: **381762(37)**

Total Practical Periods: **28**

Total Marks in End Semester Exam: **40**

List of experiments

1. Prepare maintenance schedule for lathe machines.
2. Prepare maintenance schedule for milling machines
3. Study of computerized maintenance management system.
4. Examination of used lubrication oils by laboratory methods spectrometric\ ferrography technique.
5. Study of various inspection & performance monitoring techniques.
6. Study of various vibration analysis techniques-vibration analysis data presentation, survey charts, data interpretations.
7. Failure analysis of bearing & gears.
8. Prepare maintenance schedule for welding shop.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

B.E. MECHANICAL ENGINEERING (PRODUCTION)

Semester: **B.E. VII Sem.**

Branch: **Mechanical Engg. (Production)**

Subject: **Innovative and Entrepreneurial skills**

Code: **381765(76)**

Total Practical Periods: **24**

Total Marks in End Semester Exam: **40**

Unit I

Innovation

Innovation- an abstract concept; creativity, innovation and imagination; types of innovation - classified according to products, processes or business organizations.

Unit II

Entrepreneurship

Who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of entrepreneurship for sustainable development.

Unit III

Difference between entrepreneur and entrepreneurship

Difference between entrepreneur and entrepreneurship, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit IV

Identification of Business Opportunities

Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

UNIT-V

Techno-Economic Feasibility of the project

Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

Text and Reference Books:

1. Competing through Innovation-Bellon & Whittington - Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Robert D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter - Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar - HPH
6. Fundamentals of entrepreneurship- Mohanty - PHI
7. Patterns of Entrepreneurship- Jack M Kaplan – Wiley
8. Innovation and Entrepreneurship Practice And Principles- Drucker, Petere- East West Press